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Adapting the PPRNet TRIP QI Model to Increase Colorectal Cancer Screening in Primary Care: A Feasibility Study

Katherine Attassi
Medical University of South Carolina

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by

Katherine Atassi

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Approved by:

Lynne Nemeth

Lynne S. Nemeth, PhD, RN
Chair, Advisory Committee

Barbara Edlund

Barbara Edlund, PhD, RN, ANP, BC

Martina Mueller, PhD

Irene Tessaro

Irene Tessaro, PhD, RN

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KATHERINE ATASSI. Adapting the PPRNet TRIP QI Model to Increase Colorectal Cancer Screening in Primary Care: A Feasibility Study. (Under direction of Lynne Nemeth).

ABSTRACT

The value of using colorectal cancer screening (CRCS) as a preventative tool in the development of colorectal cancer (CRC) is well established; however, mobilizing patients to participate in one of the CRCS methods remains an issue. Research to engage patients more actively in CRCS has shown that health care providers have the most influence on patient participation.

This dissertation first examines the various provider-directed interventions proven to increase CRCS in the primary care setting. Next, the detailed theoretical and methodological processes are examined based on the previous research from the first article. The PPRNet TRIP QI Model was chosen based on a clear and applicable theoretical framework with proven strategic interventions to increase CRCS in the primary care setting. Finally, the qualitative and quantitative results from implementation of the PPRNet TRIP QI Model in a rural, West Virginia primary care setting are analyzed, confirming feasibility of implementation and showing promising early indications of success to increase CRCS rates. The information presented within this dissertation creates the foundation for future studies of implementing the PPRNet TRIP QI Model to increase CRCS in rural, primary care settings.

INTRODUCTION

Colorectal cancer (CRC) is the second leading cause of cancer-related deaths in the United States (US) despite being the one cancer that is preventable through the removal of precancerous lesions. Moreover, CRC is highly treatable when found in the early stages through the implementation of some form of colorectal cancer screening

(CRCS) (American Cancer Society, 2012). The disparity between the continued high mortality of CRC and the relative ease of prevention through CRCS requires continued research and attention. In primary care settings particularly, evidence-based interventional research is essential to increase CRCS (Klabunde, Lanier, Breslau, Zapka, & et al., 2007; U.S. Preventive Services Task Force, 2008; J. Zapka, 2008). These difficult but apparently solvable problems led the Oncology Nursing Society (ONS) 2009-2013 Research Agenda to identify CRCS as an area needing more health promotion and evidence-based interventional research utilizing technology (Oncology Nursing Society, 2009). Furthermore, increasing CRCS to 75% by 2020 is an American Cancer Society (ACS) 2015 objective and a Healthy People 2020 objective (American Cancer Society, 2010; Healthy People 2020, 2011).

Though great strides have been taken to develop and publicize CRCS guidelines for patients and providers, one main barrier to improved prevention remains. Multiple and varying CRCS guidelines exist from various organizations, leading to some confusion on the part of providers and patients. In addition, these various CRCS test options have different benefits, risks, and intervals for screening to consider. These confusing factors adversely affect CRCS rates (Haas et al., 2007; Klabunde et al., 2003; Vernon et al., 2004; Wei, Ryan, Dietrich, & Colditz, 2005). To decrease this confusion, the U.S. Preventive Services Task Force (USPSTF) (2008) revised the National Cancer Institute's (NCI) CRCS guidelines using an evidence-based approach to provide the best recommendations, including the potential benefits, potential harms, effectiveness and the most current research for each test. The most recent CRCS guidelines are that average-risk adults between the ages of 50 and 75 years should undergo either high-sensitivity

FOBT annually, flexible sigmoidoscopy every 5 years with high-sensitivity FOBT every 3 years, or colonoscopy every 10 years (U.S. Preventive Services Task Force, 2008).

Even with evidence-based research to support this clear array of CRCS options, patients are still faced with the decision of whether or not to adhere to a CRCS test at all, and then which CRCS test to choose. Understanding how patients decide whether or not to participate in CRCS is crucial to increasing the rates of screening. It is well researched and documented that the primary factor influencing patients' CRCS decision is their providers' recommendations (Beydoun & Beydoun, 2008; Guessous et al., 2010; Klabunde, et al., 2007; Klabunde et al., 2009; Sabatino, Harbarta, Baron, Coates, & et al., 2008; Sarfaty & Wender, 2007; Seef, Nadel, Klabunde, & et al., 2004; Vernon, et al., 2004; J. Zapka, 2008). Unfortunately, providers often miss opportunities to recommend some form of CRCS due to comorbidities, patient refusal, physician forgetfulness, lack of time, other health priorities during office visits, or a lack of systems to track patient records and remind providers of screening need (Guerra et al., 2007; Sabatino, et al., 2008; J. Zapka, 2008; J. G. Zapka & Lemon, 2004). The transition from a sole provider approach to a systems approach is therefore an identified research need to promote the uptake of CRCS (U.S. Preventive Services Task Force, 2008). A provider-directed office-systems approach allows each office staff member to help improve screening practices under office leadership (providers and office managers) (Nemeth, Jenkins, Nietert, & Ornstein, 2011). Current research regarding provider-directed office-system interventions is recently evolving and showing great potential (Lane, Messina, Cavanagh, & Chen, 2008; Ornstein, Nemeth, Jenkins, & Nietert, 2010; Ornstein et al., 2008; J. Zapka, 2008).

Using an evidence-based, theoretical framework, the Practice Partner Research Network Translation of Research into Practice Quality Improvement Model (PPRNet TRIP QI Model) was shown to increase CRCS rates (Ornstein, et al., 2010). This framework incorporated intervention, improvement, and practice development components to facilitate implementation of CRCS in community-based primary care practices (Nemeth, et al., 2011). Interventional components were implemented through academic detailing and best practice information, participatory planning, and quarterly reports that assess EMRs and provide feedback to providers about their patients' status within an area of needed change. Improvement components included inclusion of all staff members, system redesign, prioritizing performance, patient activation and EMR tools. Practice development components (behaviors) for practice leaders included the following: activating the office staff, setting a practice vision with clear goals, improving communication, increasing knowledge about the rationale for changes for staff, taking small steps to transition into new office processes including EMR tools, and using performance feedback continually to improve clinical effectiveness. These three main components--interventions, improvement, and practice development--delineate the specific strategies or interventions and the 7 steps within the process of change that can be used by office staff to implement this model.

The incorporation of electronic medical record assessment and feedback, academic detailing, participatory planning, and discussion of best practice habits within the PPRNet TRIP QI Model provided the best primary care practice opportunities to increase CRCS screening rates (Ornstein, et al., 2010). EMR-based assessment and feedback on a quarterly basis provided solid evidence of a primary care practices' CRCS

rates. Academic detailing for all office members helped to increase understanding regarding the value of preventive screening practices. Dissemination of best practices helped build knowledge of office staff related to what has previously worked in other settings and ideas for implementation. Participatory planning enabled context-specific innovations to address CRCS methods. Synergy was achieved by educating and training office staff, resulting in the ability to delegate some screening responsibilities to office staff to facilitate better CRCS practices in a primary care office setting.

The focus of this doctoral dissertation evolved over time, mirroring the progression of research on CRCS generally. Research has shifted from a focus on effective patient interventions to increase CRCS to a focus on effective provider interventions to increase CRCS rates. The literature has evolved around the central theme of determining which current provider-directed interventions have been effectively used in primary care to increase CRCS rates. Based on further literature review, it became clearer that a key research question must be focused on a provider-directed office-system interventional approach to increase CRCS rates. This research has been successful in the large-scale Practice Partner Research Network (PPRNet) organization (Nemeth, et al., 2011; Ornstein, et al., 2010), but it is unclear whether it can be replicated effectively outside the PPRNet organization in a single, rural, West Virginia primary care office setting.

SPECIFIC AIMS

This dissertation consists of three manuscripts; (1) an integrative review of current provider strategies used to increase colorectal cancer screening, (2) a description of the significance of provider-directed office-systems interventions with a focus on how

to implement the PPRNet TRIP QI Model, and (3) an analysis of the feasibility and adaptation of the PPRNet TRIP QI Model to increase CRCS in a West Virginia primary care setting. This dissertation elucidates evidence-based research on increasing CRCS rates. Further, this research identifies, replicates, and applies a theoretical framework proven effective for a large organization within a region of need and in the context of an independent, rural primary care setting.

Aim 1: To appraise and synthesize the literature on current provider-directed interventions to increase CRCS rates.

The first manuscript is a comprehensive integrative review of the literature on provider-directed interventions aimed to increase CRCS rates (Atassi, in press). Studies were included if they used at least one of the provider pathways identified by the USPSTF (2008): provider assessment and feedback, provider incentives, and provider recommendation and recall systems. A total of 11 studies were analyzed. Results revealed that using multiple provider-directed interventions with a provider-directed, office-system approach in the primary care setting showed the most promise for increasing CRCS rates (Lane, et al., 2008; Ornstein, et al., 2010). Ornstein et al. (2010) was the only study built on a theoretical framework (PPRNet TRIP QI Model) to guide provider-directed, office-system interventions including EMR assessment and feedback, academic detailing, participatory planning, and discussion of best practice habits. This PPRNet TRIP QI Model provided a roadmap that increased CRCS rates.

Aim 2: To develop a quantitative and qualitative methodology utilizing and applying the PPRNet TRIP QI Model and interventions in a rural, independent, West Virginia primary care setting.

The second manuscript is focused on developing a mixed methodology grounded in the PPRNet TRIP QI Model to implement CRCS changes in a rural, West Virginia primary care setting. The process of adapting and using the PPRNet TRIP QI Model provided a clearly articulated theoretical framework to guide practice performance improvement, yet each practice/office system tailors interventions to their individual needs and capabilities. These interventions included site visits, participatory planning, an EMR reminder system, academic detailing, best practice dissemination, an EMR assessment, and feedback. Using a simple, interrupted time series pre-post design with focus group interviewing, this methodology will be used to determine the feasibility of adapting the PPRNet TRIP QI Model to increase CRCS rates in a rural, independent West Virginia primary care practice.

Aim 3: To evaluate the feasibility of applying the PPRNet TRIP QI Model and interventions in a rural, independent, West Virginia primary care setting.

The third investigation is a pilot study to test the feasibility of adapting provider-directed office-system interventions within the PPRNet TRIP QI Model for implementation in an independent, rural West Virginia primary care practice. The study obtains estimates of variability for relevant outcome measures of the interventions as input for future, larger interventional studies to increase CRCS recommendations and rates. Three months of retrospective data from 2010 were collected from medical record review for patients fitting the inclusion criteria. Office interventions were then implemented. They included academic detailing, monthly site visits, best practice interventions, participatory planning, and electronic medical record (EMR) reminders. Once interventions were implemented, prospective data collection began for the same 3-

month time period one year following the retrospective data. Upon completion of the 3-month prospective data collection period, an office staff focus group interview was conducted to determine what interventions were used and were effective. The results of the pilot study showed that it is very feasible to implement the PPRNet TRIP QI Model in an independent, rural West Virginia primary care setting. In addition, this model was effective at increasing CRCS recommendation rates and showed preliminary signals of increasing CRCS screening rates.

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PAPER I – COMPREHENSIVE REVIEW

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INTRODUCTION

Colorectal cancer (CRC) is the third leading cause of death for men and women in the United States, yet it is also preventable or amenable to early diagnosis when colorectal cancer screening (CRCS) is implemented. Despite numerous national campaigns aimed at increasing public awareness for screening, CRCS remains underutilized (American Cancer Society, 2010; Steinwachs, Allen, Barlow, & et al., 2010).

Evidence-based CRCS guidelines have been developed by several national organizations to educate the public and providers about the various tests available to screen for CRC (Rex et al., 2009; U.S. Preventive Services Task Force, 2008). Furthermore, because of the variety, specificity, and sensitivity of tests available, confusion and inconsistencies remain, resulting in low CRCS rates (Haas et al., 2007; Klabunde et al., 2003; Vernon et al., 2004; Wei, Ryan, Dietrich, & Colditz, 2005). In addition, providers cited as barriers to adhering to CRCS guidelines several factors: patient comorbidities, patient refusal, provider forgetfulness, lack of time, other health

priorities during office visits, and lack of reminders and tracking systems (Guerra et al., 2007; J. Zapka, 2008). This paper will analyze the various provider-directed interventions to increase CRCS rates (Haas et al., 2007).

BACKGROUND AND SIGNIFICANCE

Though the number of deaths from CRC continues to decline since 1998, most likely related to increased CRCS practices, CRC remains the third most common cause of cancer deaths in men and women, with 51,370 estimated deaths from CRC in 2010 (American Cancer Society, 2010b; Centers for Disease Control and Prevention, 2011). Up to 60% of CRC deaths can be prevented with some form of CRCS by removal of pre-cancerous polyps (American Cancer Society, 2010a). For adults age 50 or older, recent statistics reveal the national CRCS adherence rate through sigmoidoscopy or colonoscopy to be 62.2 % (Shapiro, Seeff, Thompson, & al., 2008). In 2008, the U. S. Preventive Services Task Force (USPSTF) slightly revised the CRCS guideline recommendations as reported by the NCI, according to the potential benefits, potential harms, effectiveness, and most current research for each test and recommend all persons age 50 to 75 years-old to undergo either 1) high sensitivity fecal occult blood testing (FOBT) annually; 2) flexible sigmoidoscopy every 5 years with high sensitivity FOBT every 3 years; 3) or colonoscopy every 10 years (Table 1) (U.S. Preventive Services Task Force, 2008).

The multiple risk factors for developing CRC include older age (50 years and older), a diet high in saturated fat and low in fiber, excessive alcohol consumption, physical inactivity, and any family history of CRC (American Cancer Society, 2010b). While primary prevention focuses on making changes to facets of diet and lifestyle, secondary prevention aims at reducing morbidity and mortality rates from CRC. CRCS

is the key means to implement secondary prevention because it allows for removing precancerous polyps or diagnosing CRC earlier.

Adherence to CRCS guidelines is key to prevention of and survival from CRC (U.S. Preventive Services Task Force, 2008). Yet, people still hesitate to proceed with CRCS due to numerous factors. Lack of provider recommendation, patient awareness and health literacy, patient embarrassment, fear, anxiety, insurance, and cost were identified patient barriers to CRCS (Guessous et al., 2010; Klabunde et al., 2005; J. Zapka, 2008).

The most significant predictor of a person proceeding with CRCS is provider recommendation (Klabunde, Lanier, Breslau, Zapka, & et al., 2007; Sarfaty & Wender, 2007). Yet, during office visits, providers often miss the opportunity to recommend or perform cancer screening (Sabatino, Harbarta, Baron, Coates, & et al., 2008; J. G. Zapka & Lemon, 2004). Therefore, it is extremely important to assess what provider-directed interventions in the primary care setting facilitate adherence to CRCS guidelines, and determine what direction future CRCS research should take.

The USPSTF (2008) identified three provider pathways to increase provider delivery for CRC screening: provider assessment and feedback, provider incentives, and provider recommendation and recall systems (provider reminders). Provider assessment and feedback interventions assess providers' performance based on the recommendation/completion of screening tests on a regular basis. Provider incentives include direct (monetary) and indirect (continuing medical education credits) rewards for recommendation/completion of screening tests. Provider reminders include colored flags in patient charts, flow charts, checklists, email reminders, or EMR reminders that bring to

the provider's attention a patient's need for cancer screening. These three pathways were then used to narrow the scope for the review of the literature.

REVIEW OF THE LITERATURE

This literature review encompasses a comprehensive assessment of the current literature related to provider-directed interventions used to increase CRCS rates using at least one of the provider pathways identified by the USPSTF (2008). Databases searched included CINAHL, MEDLINE, PubMed, Cochrane Library, and Cochrane Central Register of Controlled Trials (supplemented with hand-searches) for United States, English-language articles published between years 2000 to 2011. Keywords *provider, interventions*, and *colorectal cancer screening* were utilized. This search resulted in 7 studies and 2 systematic reviews. The systematic reviews were then analyzed for individual studies to be included in this review, resulting in 5 additional articles. Several studies were found in multiple databases and therefore counted only once.

Studies were included if they used at least one of the provider pathways identified by the USPSTF (2008). Several studies incorporated patient interventions in addition to provider interventions. These studies were included if interventions were conducted separately and if statistical analyses were reported separately to eliminate the potential for contamination of provider intervention data. After inclusion and exclusion criteria were applied, 11 studies were accepted for final review and use. Nine studies were randomized control trials (RCTs) (Ayanian, Sequist, Zaslavsky, & Johannes, 2008; Goldberg et al., 2000; Lane, Messina, Cavanagh, & Chen, 2008; Nease et al., 2008; Ornstein, Nemeth, Jenkins, & Nietert, 2010; Roetzheim et al., 2004; Ruffin IV & Gorenflo, 2004; Sequist, Zaslavsky, Marshall, Fletcher, & Ayanian, 2009; Shankaran et al., 2009; Thompson et al.,

2000), one study was a non-randomized RCT (Goldberg, et al., 2000), and one study was a time-series analysis (Persell et al., 2011).

Provider reminder and recall systems

The types of provider reminders varied, from interoffice letters (Ayanian, et al., 2008) to electronic computer reminders (Sequist, et al., 2009) to computerized paper attachments to charts (Goldberg, et al., 2000). Exclusive use of provider reminders showed mixed results in three studies. Reminders mailed to physicians increased surveillance colonoscopy by 9.2% compared to 4.5% in the control group (P = .009) (Ayanian, et al., 2008). The Clinical Reminder and Outcomes System (CROS) did not produce a significant change in FOBT at baseline or intervention periods (Goldberg, et al., 2000). Sequist et al. (2009) implemented electronic reminders during office visits for the provider intervention. The provider intervention showed no significant change from the control group (41.9% vs. 40.2%; P = .47), but the more office visits a patient had, the higher the CRCS rates. Patients with 3 or more office visits experienced increased CRCS rates of 59.5% versus 52.7% (P = .10) in the control group. Two studies showed an increase in the detection of adenomas (Ayanian, et al., 2008; Sequist, et al., 2009). Mixed methods were used in Nease et al. (2008), who deployed ClinfoTracker, a computer reminder system set up according to the USPTF (2008) guidelines. All staff members were trained to use ClinfoTracker and two offices without electronic scheduling used reminder forms attached to patient charts. The average baseline CRCS rates for sites was 41.7% and nine months, CRCS rates increased to 50.9% (range 33.2 – 66.5%) with an average increase of 9% (range 9 – 24%; P = 0.002).

Academic detailing and provider incentives

Academic detailing is used to increase knowledge through some form of education such as providing written documents or a presentation. Shankaran et al. (2009) implemented academic detailing and a $100 honorarium was given to participating physicians. Outcomes measures at 12 months showed a 7% increase in colonoscopies.

Reminder and recall system with assessment and feedback

Persell et al. (2011) combined reminder systems with assessment and feedback for a time-series analysis. A flagging system within the EMR was implemented. Providers received quarterly performance reports over the 2-year study period. The baseline CRCS rate was 53.7% ($P = 0.007$) and rose to 62% ($P < 0.001$).

Roetzheim et al. (2004) conducted a clustered RCT to determine the efficacy of the Cancer Screening Office Systems (Cancer SOS) intervention to increase the use of FOBT in 8 underserved, county-funded primary health clinics. Office staff was trained to ensure patient completion of a cancer screening checklist and to use chart stickers that reflected screening status. Every 6 months, office staff received feedback for CRCS rates. Random chart reviews at baseline and at 12 months showed that the intervention increased the odds for FOBT (OR = 2.5, 95% CI, 1.65 – 4.0, $P < .0001$).

Reminder and recall system with participatory planning

Ruffin & Gorenflo (2004) developed an RCT with four arms: a control arm, office intervention arm, patient intervention arm, and a combined office and patient intervention arm. The office intervention arm varied from practice to practice slightly as each office staff determined what steps they wanted to make in the office setting to increase screening recommendations. Baseline FOBT rates were 38% among control practices,

35% for office intervention practices, 38% for patient intervention practices, and 31% among practices that used both interventions. After one year, all practices showed an increase in FOBT but at year 2, FOBT rates dropped for all practices. Despite even the small increase for the combined intervention in year three, these various interventions made no significant long-term difference on FOBT.

Thompson et al. (2000) targeted their intervention on licensed practical nurses (LPNs). FOBT-eligible patients were identified by the LPN and then completed the Health Promotion Screening Form. Once approved by the provider, the patient received an FOBT kit from the receptionist upon departure with 90 days to return all cards. Compared to the control group, FOBT increased (15% vs. 52%, $P<0.001$).

Provider incentives, academic detailing, and participatory planning

Lane et al. (2008) conducted an RCT that utilized three provider interventions to increase provider endoscopy referral and/or FOBT dispensing/completion in community health centers. First, a pre-intervention visit was made by the educator/facilitator to build partnerships with the sites. Second, a one-hour continuing medical education (CME)-approved educational session was given. Third, a strategic planning session was conducted at each site with all staff members using SWOT (strengths, weaknesses, opportunities, and threats) analysis. Each site then developed its own action plan to delineate responsibilities and actions to increase CRCS. Based on medical record audits, the intervention group had a 16% increase from baseline in CRCS referral/dispensing/completion compared to 4% in the control group (OR = 2.25, range = 1.67 – 3.03, $P < .001$).

EMR based assessment and feedback, academic detailing, participatory planning, and best practice dissemination

Over two years, Ornstein, Nemeth, Jenkins & Nietert (2010) conducted a group-randomized intervention trial that combined 1) electronic medical record audit and feedback 2) practice site visits with academic detailing with 3) participatory planning, and 4) best practice dissemination meetings for the interventional group (Ornstein, et al., 2010). Thirty-two internal medicine and family medicine practices gathered and reported quarterly data and received practice and provider feedback regarding the CRCS status of their patients. Site visits were conducted every 6 months to facilitate use of the Practice Partner Research Network (PPRNet) model and share best practice approaches to improve practice performance. After two years, a repeat EMR review was conducted to measure practice using the same criteria as in the baseline practice data collection. EMR results showed that the intervention practices increased CRCS from 60.7% to 71.2%, compared to an increase among control practices' from 57.7% to 62.8% with the adjusted difference of 4.9% (95% CI, range 3.8% – 6.1%). The percentage of practices' recommendations for CRCS also increased in the intervention practices, with an adjusted difference of 7.9% (95% CI, range 6.3% - 9.5%).

DISCUSSION

The studies reveal that there is greater opportunity for success to increase CRCS. Combining two provider-directed interventions showed a positive and synergistic effect to increase CRCS (Persell, et al., 2011; Roetzheim, et al., 2004; Shankaran, et al., 2009). Combining multiple provider-directed interventions proved to be very effective and

showed a statistically significant increase in CRCS rates (Lane, et al., 2008; Ornstein, et al., 2010).

Among the published work, only Ornstein et al. (2010) identified a guiding framework, the PPRNet TRIP QI Model (Figure 1). The implementation of this model proved to be very successful to increase CRCS in this study. The PPRNet TRIP QI Model was developed from previous research grounded in complexity science theory and microsystems theory to explain improvements in office systems when interventions to utilize clinical guidelines were implemented (Feifer & Ornstein, 2004; Nemeth, Feifer, Stuart, & Ornstein, 2008; Nemeth, Nietert, & Ornstein, 2009). This model is delivered using practice performance reports from electronic medical records (EMR) data extracts on a set of quality indicators relevant to primary care. Site visits and network meetings are utilized to develop a practice-wide learning organization. In conjunction with this model, the concepts for practice development were established by Nemeth et al. (2008), extending the Institute of Medicine's (IOM) work on microsystems (Donaldson & Mohr, 2000), from large, integrated health care delivery systems to – small to medium – sized independent primary care practice. Four well-defined components – organizational leadership, people, performance and improvement, and information—were used to learn the primary care practice's organizational structure, communication systems, roles and responsibilities of its members, and leadership abilities of all members within that specific microsystem (Nemeth, et al., 2008). The process of change includes: (1) vision with clear goals; (2) team involvement; (3) enhanced communication systems; (4) developed staff knowledge; (5) small, incremental steps; (6) EMR assimilation into practice; and (7) feedback within a culture of improvement. Figure 1 shows the

integration of this process of change into the provider-directed office system interventions.

This model has been tested in the nationwide Practice Partner Research Network and has proven effective at increasing CRCS rates (Nemeth, et al., 2009; Ornstein, et al., 2010). It is expected that this model will continue to provide the direction and framework to increase CRCS. Herein lies a great opportunity to utilize and apply this model in real world settings by providers such as nurse practitioners to significantly increase in CRCS rates in their practices.

LIMITATIONS

Several of these reviewed studies included limitations such as time (Sequist, et al., 2009; Thompson, et al., 2000), turnover in providers and/or staff members (Ruffin IV & Gorenflo, 2004), failure to implement interventions as planned (Nease, et al., 2008; Ruffin IV & Gorenflo, 2004), changes in financial reimbursement (Ruffin IV & Gorenflo, 2004), the Hawthorne Effect (Persell, et al., 2011; Ruffin IV & Gorenflo, 2004), and maintain updated advances in technology (Klabunde, Lanier, Meissner, Breslau, & Brown, 2008). The use of a theoretical framework is rarely mentioned with the exception of Ornstein et al. (2008). Also, the drawback of using multiple interventions is the inability to determine which intervention was most effective.

Greater attention to the CRCS practices for all providers is warranted, especially for nurse practitioners. Primary care physicians account for less than one-third of all U.S. physicians and this proportion is declining (Klabunde, et al., 2008). Seven of the studies assessed only physician CRCS practices (Ayanian, et al., 2008; Nease, et al., 2008; Persell, et al., 2011; Ruffin IV & Gorenflo, 2004; Sequist, et al., 2009; Shankaran, et al.,

2009; Zubarik et al., 2000). The role of nurse practitioners in the primary care setting has not been discussed in depth in the literature (Nemeth et al., 2007). Most studies were conducted in urban, academic settings (Ayanian, et al., 2008; Goldberg, et al., 2000; Persell, et al., 2011; Sequist, et al., 2009; Shankaran, et al., 2009; Thompson, et al., 2000; Zubarik, et al., 2000). Future research must include the valuable role of nurse practitioners, as nurse practitioners are working to fill the gap in primary care and rural health care.

IMPLICATIONS

The process of combining multiple provider-directed interventions with an office team approach in the primary care setting showed great success (Lane, et al., 2008; Ornstein, et al., 2010; Ornstein et al., 2008; J. Zapka, 2008). EMR assessment and feedback, academic detailing, participatory planning, and discussion of best practice habits as delineated in the PPRNet TRIP QI Model can provide the roadmap to successfully increase CRCS rates (Ornstein, et al., 2010). Nurse practitioners are in an ideal position to help implement and facilitate use of this model to detect CRC earlier in their patients.

CONCLUSION

The use of multiple provider-directed interventions with an office system team approach is the best way to increase CRCS rates in the primary care practice setting. This analysis endorses the use of the PPRNet TRIP QI Model which includes EMR based assessment and feedback, academic detailing, reminder systems, and participatory planning for best practice dissemination to increase CRCS rates in primary care practices. More longitudinal research is needed as well as conducting research in the rural setting

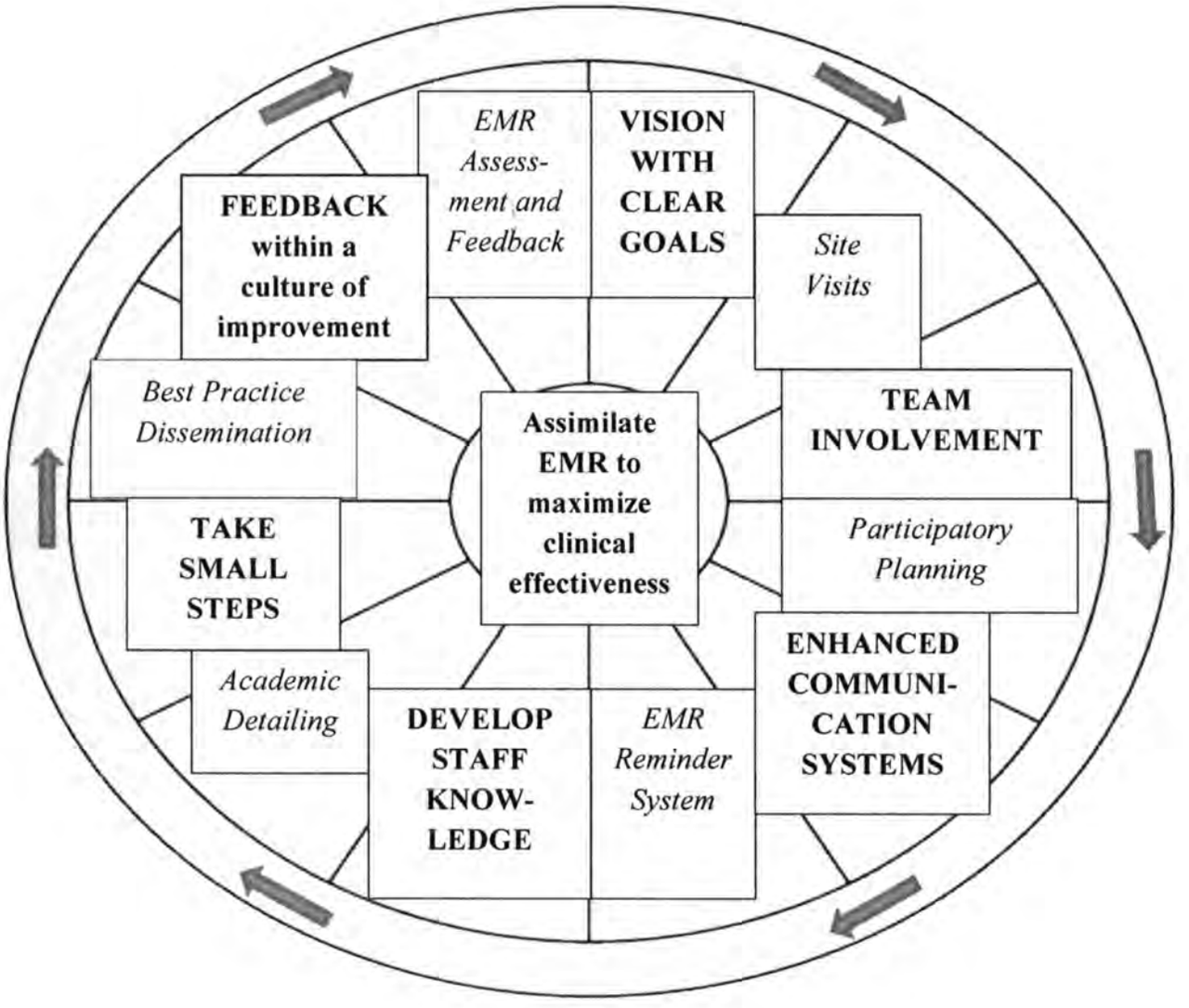
and including nurse practitioner practices. Nurse practitioners are in an excellent position to implement and guide the utilization of the PPRNet TRIP QI Model in their practices to increase CRCS.

Table 1. U.S. Preventative Services Task Force Colorectal Cancer Screening Recommendations (2008)

The USPSTF recommends screening for colorectal cancer (CRC) using fecal occult blood testing (FOBT), sigmoidoscopy, or colonoscopy, in adults, beginning at age 50 years and continuing until age 75 years.

Test	Interval	Risks for Complications
High-sensitivity FOBT	Annual	Inadequate evidence to determine harm but assessed as small
Flexible sigmoidoscopy	Every 5 years	Adequate evidence shows serious complications in 3.4 per 10,000 procedures
with high sensitivity FOBT	Every 3 years	
Colonoscopy	Every 10 years	Adequate evidence shows serious complications in 3.8 per 10,000 procedures

Figure 1. Adapted with permission from Nemeth et al. (2008). Integration of Provider-Directed Office System Interventions into the PPRNet TRIP QI Model.



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PAPER II – METHODS

Atassi, K. A., Nemeth, L. S., Edlund, B., Mueller, M., and Tessaro, I. *Adapting the PPRNet TRIP QI model to increase colorectal cancer screening in primary care.* Unpublished manuscript, College of Nursing, Medical University of South Carolina, Charleston, South Carolina.

INTRODUCTION

Colorectal cancer screening (CRCS) allows the diagnosis of precancerous lesions and early-stage colorectal cancer (CRC), when morbidity and mortality rates are low and cure is possible. To increase CRCS rates, several national organizations have developed CRCS guidelines to educate the public and providers. Adherence to these CRCS guidelines is key in the prevention of and survival from CRC. Another factor strongly influencing patient participation in CRCS is provider recommendation (Sabatino, Harbarta, Baron, Coates, & et al., 2008; J. G. Zapka & Lemon, 2004). Unfortunately, due to multiple factors, providers too often overlook the chance to screen for CRC during office visits. To increase CRCS rates in primary care, the literature indicates that combining multiple provider-directed with office-system-directed interventions shows the most potential (Lane, Messina, Cavanagh, & Chen, 2008; Ornstein, Nemeth, Jenkins, & Nietert, 2010; Ornstein et al., 2008; J. Zapka, 2008).

This article describes the methods of a pilot study that aimed to demonstrate the feasibility of implementing provider-directed office-system interventions in an

independent, rural West Virginia primary care office setting to increase CRCS recommendations and rates. The interventions were developed by the Practice Partner Research Network (PPRNet) using its' Translating Research into Practice (TRIP) Quality Improvement (QI) Model. Provider-directed office-system interventions included the use of an electronic medical record (EMR) reminder with assessment and feedback, academic detailing, participatory planning, and best practice dissemination. However, rather than describing these outcomes, this articles delineates the detailed methodology and therefore presents some of the challenges that may be associated with adapting the PPRNet TRIP QI Model in a rural, independent primary care setting.

BACKGROUND AND SIGNIFICANCE

In 2011, an estimated 141,210 people will be diagnosed with CRC, and an estimated 49,380 will die, making CRC the third most commonly diagnosed cancer in men and women in the United States (American Cancer Society, 2010b). Patient risk factors for CRC include older age (≥50 years), a diet high in saturated fat and low in fiber, excessive alcohol consumption, physical inactivity, and a family history of CRC (American Cancer Society, 2010b).

Based on 2003 to 2007 data, West Virginia (21.0 per 100,000 persons) had the highest overall death rate in the nation (17.6 per 100,000 persons) from CRC (U.S. Department of Health and Human Services, 2010). West Virginia women also had the highest incidence and death rate in the nation from CRC (American Cancer Society, 2010b). The most recent statistics revealed a national CRCS rate by FOBT, sigmoidoscopy, or colonoscopy of 66.6% and a West Virginia CRCS rate of 56.6% (Rim, Joseph, Steele, Thompson, & Seeff, 2011). Furthermore, the West Virginia Appalachian

population has many risk factors for CRC, including obesity, physical inactivity, poor dietary choices, and older age (Behringer & Friedall, 2006; Coyne, Demian-Popescu, & Friend, 2006; Lengerich et al., 2006; Lengerich et al., 2004; The Kaiser Family Foundation, 2009a, 2009b, 2009c). The majority of the population lives in rural areas with many disparities, including higher poverty rates, lower educational levels, lower socioeconomic status, lack of public transportation, and a large, elderly population (Behringer & Friedall, 2006; Centers for Disease Control and Prevention, 2009; Lengerich, et al., 2006). These risk factors and disparities compound the vulnerability of the West Virginia Appalachian population, in addition to rural medical underservice issues, such as limited access to health care education, research, and prevention (Behringer & Friedall, 2006).

Several versions of CRCS guidelines have been developed by various organizations to instruct patients and providers about the available CRCS test options. These multiple versions of guidelines have caused confusion, resulting in inconsistent and lower CRCS rates (Haas et al., 2007; Klabunde et al., 2003; Vernon et al., 2004; Wei, Ryan, Dietrich, & Colditz, 2005). Additional patient barriers include the following: lack of provider recommendation, limited awareness, low health literacy, embarrassment, fear, a perception of low risk, limited insurance, high cost, previous negative medical experiences of family and friends, and distrust of the health system (Tessaro, Mangone, Parker, & Pawar, 2006; Vernon, et al., 2004; Zapka, 2008). Contributing to provider barriers to CRCS guideline adherence are patient comorbidities, patient refusal, physician forgetfulness, lack of time, other health priorities during office visits, and a lack of reminder and tracking systems (Guerra et al., 2007; Zapka, 2008).

Adherence to CRCS guidelines is crucial for prevention of and survival from CRC. The removal of precancerous polyps has the potential to reduce CRC deaths up to 60% and diagnose CRC in the stages when 5-year survival rates are 90% (American Cancer Society, 2010a). The U.S. Preventive Services Task Force (2008) revised the National Cancer Institute's (NCI) CRCS guidelines by including the potential benefits, potential harms, effectiveness, and most current research for each test. The most current recommendation for CRCS is for all persons age 50 to 75 to undergo any one of the following: 1) high sensitivity fecal occult blood testing (FOBT) annually; 2) flexible sigmoidoscopy every 5 years with high-sensitivity FOBT annually; or 3) colonoscopy every 10 years (U.S. Preventive Services Task Force, 2008).

Even though provider recommendation is the main determinant influencing a patient's CRCS decision, providers often fail to take advantage of the chance to recommend CRCS (Sabatino, Harbarta, Baron, Coates, & et al., 2008; Vernon, et al., 2004; Zapka, 2008). Therefore, it is important to implement effective provider-directed office-system interventions in the primary care setting to increase adherence to CRC guidelines.

Research regarding provider-directed office-system interventions has been evolving and showing success (Lane, Messina, Cavanagh, & Chen, 2008; Ornstein, Nemeth, Jenkins, & Nietert, 2010; Ornstein et al., 2008; Zapka, 2008). The incorporation of electronic medical record assessment and feedback, academic detailing, participatory planning, and discussion of best practice habits within the PPRNet TRIP QI Model provided the most promising primary care practice opportunities to increase CRCS screening rates (Ornstein, et al., 2010). The proposed feasibility study adapted these

provider-directed office-system interventions within the PPRNet TRIP QI Model for implementation in an independent, rural West Virginia primary care practice to increase CRCS rates.

THEORETICAL FRAMEWORK

The PPRNet TRIP QI Model was developed from previous research grounded in complexity science theory and microsystems theory to explain improvements in office systems when interventions to utilize clinical guidelines were implemented (Feifer & Ornstein, 2004; Nemeth, Feifer, Stuart, & Ornstein, 2008; Nemeth, Nietert, & Ornstein, 2009). This process of change includes: (1) vision with clear goals; (2) team involvement; (3) enhanced communication systems; (4) developed staff knowledge; (5) small, incremental steps; (6) EMR assimilation into practice; and (7) feedback within a culture of improvement. Figure 1 shows the integration of this process of change into the six provider-directed office-system interventions. This framework has been tested in the nationwide Practice Partner Research Network and has proven to be effective at increasing CRCS rates (Nemeth, et al., 2009; Ornstein, et al., 2010).

LITERATURE REVIEW

In an integrative review, the state of provider-directed interventions was examined over the past ten years to determine which methods were most successful to increase CRCS rates (Atassi, in press). Studies were included if they used (a) provider assessment and feedback interventions; (b) provider incentives; and/or (c) provider reminder and recall systems as outlined by the Task Force on Community Preventive Services (2008).

Studies with single interventions showed varying impacts on CRCS rates. Provider reminder and recall systems–such as interoffice letters (Ayanian, Sequist, Zaslavsky, & Johannes, 2008), computerized paper attachments to charts (Goldberg et al., 2000), or electronic medical record reminders (Nease et al., 2008; Sequist, Zaslavsky, Marshall, Fletcher, & Ayanian, 2009)–showed limited success at increasing CRCS rates, with none reaching statistically significant levels. However, CRCS rates rose when patients had more frequent office visits (Sequist, et al., 2009). Academic detailing also had a positive though non-significant impact on CRCS rates (Zubarik et al., 2000).

Several studies combined two provider-directed interventions that had positive effects on CRCS rates. Academic detailing combined with provider incentives increased colonoscopies by 7% (Shankaran et al., 2009). Two studies implemented a reminder system with assessment and feedback (Persell et al., 2011; Roetzheim et al., 2004). Persell et al. (2011) used an EMR reminder system with quarterly performance reports that increased CRCS rates from 53.7% to 62% ($P<0.001$) at the end of the 2-year study. Roetzheim et al. (2004) implemented a chart checklist with feedback provided every six months over one year that showed this combination of interventions increased FOBT. Two other studies utilized a reminder system with participatory planning sessions (Ruffin IV & Gorenflo, 2004; Thompson et al., 2000). Initially, the RCT by Ruffin and Gorenflo (2004) showed increased FOBT, but that increase was not sustained over the next two years and therefore did not result in any lasting improvements for FOBT. Thompson et al. (2000) targeted LPNs to confirm eligibility for FOBT according to a pre-printed list, educating and flagging patients for providers to review and consent on FOBT. This

combination of interventions significantly increased FOBT compared to the control group (15% vs. 52%, P<0.001).

Two studies combined four different provider-directed interventions that showed more significant effects on CRCS rates (Lane, et al., 2008; Ornstein, et al., 2010). Lane et al. (2008) conducted a RCT that utilized multiple interventions: (1) assessment and feedback; (2) provider incentives; (3) academic detailing, and (4) participatory planning. Baseline data were collected, and initial site visits were conducted to begin the education process and build rapport with sites. A one-hour continuing medical education (CME)-approved academic detailing session was then given, followed by a strategic planning session, with each site using SWOT analysis. Each site then developed its own plan of action and interventions to increase CRCS. Upon completion of the study, medical records were audited again and revealed a 16% increase in CRCS referral/dispensing/completion, compared to 4% in the control group (OR = 2.25, range = 1.67 – 3.03, P < 0.001).

Ornstein, Nemeth, Jenkins and Nietert (2010) conducted a 2-year, group RCT that combined several quality improvement interventions: (1) electronic medical record audit and feedback; (2) practice site visits with academic detailing; (3) participatory planning; and (4) best practice dissemination meetings for the interventional group. The study included 32 internal medicine/family medicine practices from 19 states with a total of 68,150 active patients aged 50 and older. Baseline data were collected through EMR review for FOBT within 1 year, flexible sigmoidoscopy within the previous 5 years, and colonoscopy within the previous 10 years. Groups were randomized using a modified constrained randomization process to maintain balance between the control and

intervention groups (Nietert, Jenkins, Nemeth, & Ornstein, 2009). Site visits were held every six months to ensure the PPRNet TRIP QI Model was implemented and to discuss best practice approaches to improve practice performance. Quarterly data were collected to monitor and provide feedback about each practice's CRCS rates. A repeat EMR review was performed two years later to measure CRCS rates for each practice using baseline criteria. Results revealed an increase of CRCS rates from 60.7% to 71.2% for the interventional group compared to 57.7% to 62.8% for the control group, with an adjusted difference of 4.9% (95% CI, 3.8% - 6.1%). Provider recommendations for CRCS also increased for the intervention group, with an adjusted difference of 7.9% (95% CI, 6.3% - 9.5%).

METHODS

Using mixed methods that combine a simple, interrupted time series, pre-post design with focus group interview, this pilot study determined the feasibility of adapting provider-directed office-system interventions within the PPRNet TRIP QI Model to increase CRCS rates in a rural, independent West Virginia primary care practice. Implementation of the multiple provider-directed office-system interventions was hypothesized to be feasible and provide preliminary indication of increased CRCS rates compared with baseline CRCS rates.

Pre-intervention Retrospective Audit & Feedback

A 3-month retrospective medical record review was conducted for patients fitting the inclusion criteria to collect data for the study variables to determine patient characteristics and baseline pre-interventional CRCS rates. Data were collected retrospectively from October 2010 through January 2011 as well as from October 2011

through January 2012 (the intervention period) to control for potential seasonal variation. For the retrospective data collection, medical records for patients fitting the inclusion criteria were audited for the presence or absence of CRCS. The PI trained one office staff member to collect all data. All patient data were de-identified and coded with an identification number for entry into an encrypted, password protected laptop computer. A paper master list was developed to link patients' medical record numbers to the study ID numbers. Laptop and papers were kept in a locked filing cabinet in the office. All papers will be shredded six years following completion of data analysis. The data collector was paid $1.00 for every retrospective medical record review. Finally, the implementation of multiple provider-directed office-system interventions was initiated according to the PPRNet TRIP QI Model.

Interventions: Site Visit, Academic Detailing, Participatory Planning, and Best Practice Dissemination

The PI conducted the initial sire visit with all office staff to build on existing rapport and trust. Following the adapted PPRNet TRIP QI Model, office staff members were asked to set the new practice vision with clear goals to increase CRCS rates. It was essential for all office staff to recognize that they were part of this new team and had power to facilitate progress toward the new practice vision. Academic detailing improved the office staff's knowledge base for CRCS so that office staff felt comfortable providing educational materials and initiating discussion about CRCS with patients. Slides adapted from the CDC's "A Call to Action" campaign were used to guide academic detailing. Discussion of "best practice" interventions from previous research and participatory

planning (Table 1) with all office staff helped determine and implement the most effective interventions within their office setting.

It was essential to take small steps toward this new vision and goals so that office staff would not feel overwhelmed by the number of new office interventions implemented and so that these steps could be easily added to the patient pre-screening routine. The office staff decided collectively which specific strategies to implement. All office staff members were trained to assimilate the EMR CRCS reminder into practice. The PI was available by phone for any questions that arose and made site visits every month to guide office staff to overcome any barriers.

Prospective EMR Audit & Feedback

Prospective data was collected over a 3-month period to determine the effect of the provider-directed office-system interventions on CRCS recommendations and rate. A follow-up period of 1 month was permitted after the 3-month implementation period to allow sufficient time for completion and to include all results of any CRCS tests in the EMR. Patients without reported results were flagged in the EMR to remind the providers to discuss CRCS again at the next office visit. The project data collector audited prospective data through the EMR system. Data collection followed the same confidential process outlined for the retrospective audit and feedback.

Focus Group Interview with Office Staff

Three months after implementation, a site visit occurred and an office staff focus group interview was conducted to debrief staff, share results of the quarterly EMR audit, and receive feedback about the interventions from the staff. Participation in the focus group interview was voluntary, and consent forms were given prior to participation. De-

identified demographic data were also collected to describe the office staff in aggregate by age, gender, race, ethnicity, and level of education. Each intervention strategy used by the office staff was evaluated as a component of the process evaluation of this study. This session was recorded using a digital voice recorder and used the PPRNet TRIP QI Model as a framework for analysis to identify and assess adherence to the various key strategies (Table 2). Barriers to and facilitators of implementation were discussed, and organizational culture was assessed. For participation in the focus group interview, office staff received a $25 grocery/gas card.

SAMPLING PLAN

This pilot study was designed to assess the feasibility of adapting and implementing provider-directed, office-system interventions, to obtain estimates of variability in CRCS rates, and to obtain preliminary indicators of the effectiveness of the interventions. The findings will guide a subsequent larger scale study to evaluate the effectiveness of the interventions in multiple rural primary care settings.

This study did not recruit patients but sought the participation of the office staff of a rural West Virginia primary care practice. This site was selected based on its rural location in a medically underserved area and the primary investigator's previous work experience in this practice. The office staff was the focus of the interventions, with the patients' CRCS status as a secondary outcome. The office staff size was n = 10. The EMR was set up to flag patients in need of CRCS according to the inclusion criteria. Office staff used this flagging to initiate the office-based system interventions.

The primary care practice targeted for this pilot study treated approximately 1,570 patients 50-75 years-old in the year prior to implementation. Given that patients tend to

visit the practice every 2-3 months, it was estimated that data could be collected on 400-500 eligible patients per group for this study (group 1/pre-interventional group: collected retrospectively prior to interventions; group 2/post-interventional group: collected prospectively after interventions). EMR and office staff identified active adult patients who had a progress note, lab or consultation record within the previous year, who were between the ages of 50 and 75, and who had no history of CRCS (FOBT within last year, flexible sigmoidoscopy within last 5 years, or colonoscopy within last 10 years), and who required updated CRCS according to the recommended guidelines. For both the pre-interventional and post-interventional groups, active patients with a history of CRC or with a terminal diagnosis were excluded.

DATA ANALYSIS PLAN

Three months after implementation, a focus group interview was conducted with all consenting office staff. Following the PPRNet TRIP QI Model as a framework for analysis, discussion was devoted to identifying specific strategies that were implemented, what efforts succeeded, and what efforts did not work so well. This session used the PPRNet TRIP QI Model as a framework for analysis to identify key strategies, barriers, and facilitators, as well as to assess organizational culture.

Data was analyzed utilizing the Statistical Package for the Social Sciences (SPSS). In a first step, the two patient data samples were characterized using descriptive statistics and compared using chi-square tests. Initial data analyses described the pre- and post-intervention variables using descriptive statistics (mean, standard deviation, and corresponding 95% confidence intervals). Categorical variables were described using frequency distributions and proportions, with corresponding 95% confidence intervals,

modes, and bar charts. In exploratory analysis, the non-parametric technique of x^2 test was used to compare the pre- and post-interventional groups' CRCS results overall and by gender. Statistical significance was set at $\alpha = 0.05$. Logistic regression was also used to examine the relationship between CRCS results and the intervention (pre/post groups) and adjusted for age, gender, employment and insurance.

POTENTIAL LIMITATIONS

This pilot study determined the feasibility of adapting provider-directed office-system interventions developed by the PPRNet TRIP QI Model for implementation in an independent, rural West Virginia primary care practice. For relevant outcome measures of the interventions, the study also provided estimates of variability needed as input for future, larger interventional studies to increase CRCS recommendation and rates in such settings. The first step before conducting a randomized trial is to demonstrate the feasibility of adapting and implementing the interventions to an independent primary care practice by conducting a feasibility study such as this one. Because this was a feasibility study within a single rural practice, results are not generalizable. However, findings were compared to those of the PPRNet TRIP QI study (Ornstein, et al., 2010). Potential variations were also taken into consideration in the study design. By choosing similar periods for data collection in 2010 (retrospective) and 2011 (prospective), the effect of a differing patient population would likely be small.

EXPECTED FINDINGS

This pilot study was undertaken to determine the feasibility of implementing provider-directed office-system interventions developed by the PPRNet TRIP QI Model for implementation in an independent, rural West Virginia primary care practice to

increase CRCS recommendations and rates. It was expected that baseline CRCS rates were close to the West Virginia average of 56.6% (Rim, et al., 2011). Previous implementation of the PPRNet TRIP QI Model showed statistically significant improvement in CRCS rates (Ornstein, et al., 2008). This pilot study was expected to demonstrate feasibility and provide indications that CRCS rates increased.

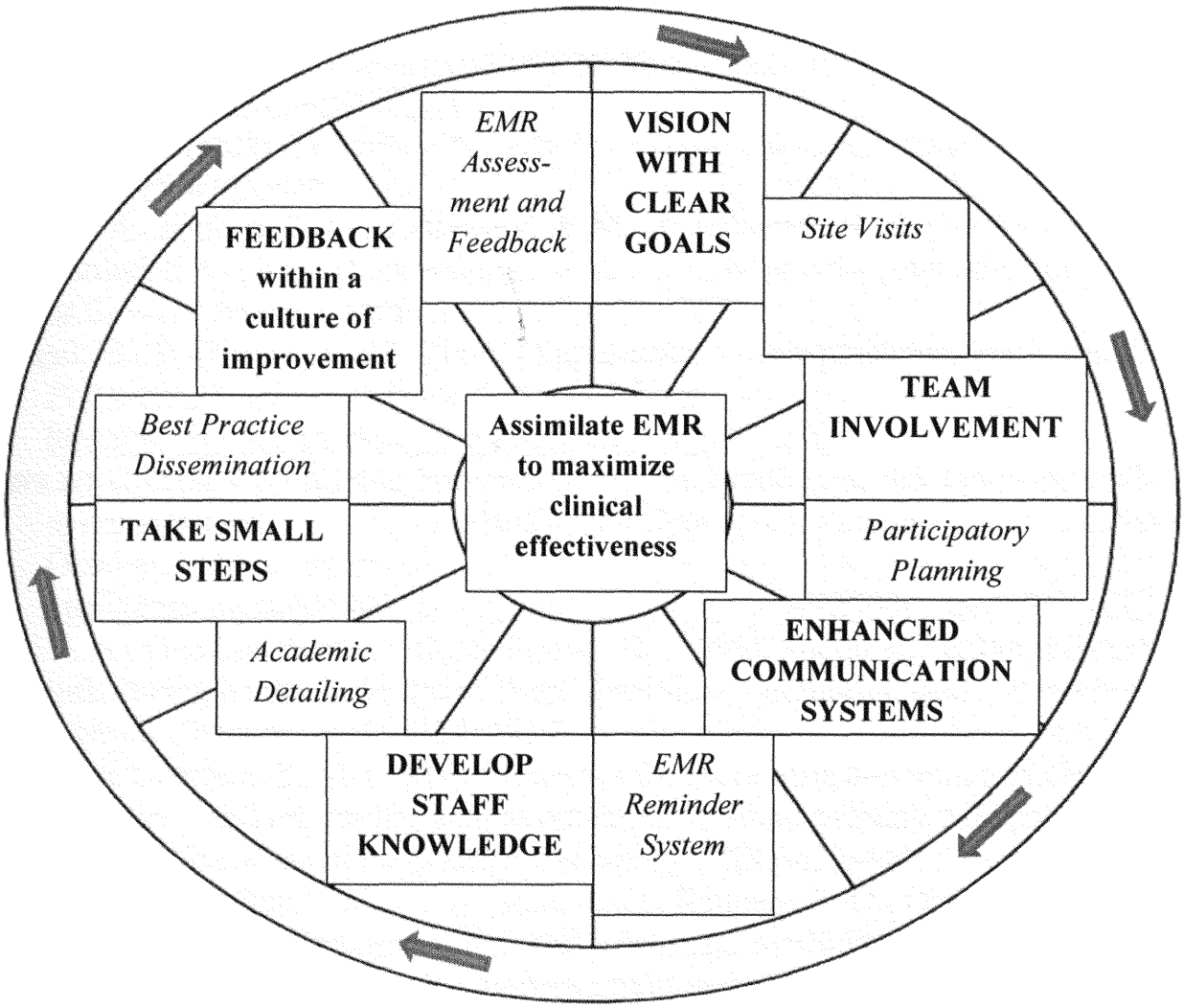
Table 1. Adapted from Nemeth, Nietart & Ornstein (2009) CRCS Improvement Strategies Promoted at Site Visits and Network Meetings

Improvement Model Category	Specific Strategies
Prioritize Performance	- Commit to practice changes needed to improve - Have regular practice meetings to review improvement approaches and their impact - Encourage fecal occult blood testing for patients who do not choose endoscopy - Use single specimen immunochemical fecal occult blood testing to increase adherence
Delivery System Design	- Adopt and publicize recommendation for regular health maintenance visits - Have standing orders for CRCS - Review CRCS status at all patient visits
Electronic Medical Record Tool	- Maintain accurate CRCS information in health maintenance tables - Use reports to identify and contact patients not current with CRCS
Patient Activation	- Repeat messages to patients who do not initially agree to screening - Provide patient education materials to those who do not readily accept screening - Contact patients that have not completed ordered screening

Table 2. Focus Group Interview Questions

1. How did you feel about the overall implementation process to increase CRCS?
2. Which specific strategies did you use?
3. What strategy was the easiest to use?
4. What (if anything) made using these specific strategies easier?
5. Which specific strategies did you start to use and then stop using?
6. What stopped you from using that specific strategy?
7. Which specific strategies didn't you use?
8. Which strategy was the most difficult to use?
9. Which strategies can you see yourself continuing to use on a regular basis with each patient?
10. What would you change (if anything) to improve the overall implementation process to increase CRCS?
11. What comments (if any) did patients have about the CRCS information they received?
12. Do you have any questions for me?

Figure 1. Adapted with permission from Nemeth et al. (2008). Integration of Provider Directed Office System Interventions into the PPRNet TRIP QI Model.



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MANUSCRIPT III – ANALYSIS OF THE PPRNET TRIP QI MODEL TO INCREASE COLORECTAL CANCER SCREENING IN A RURAL, INDEPENDENT PRIMARY CARE SETTING

This manuscript has been submitted to the Journal of Nursing Care Quality. (upon completion of the pilot study)

ABSTRACT

Background: Established CRCS guidelines for providers and the public exist, but due to several versions of CRCS guidelines and the variety of test options, confusion often arises among patients and providers, adversely affecting CRCS rates. Improving providers' opportunities to recommend or perform CRCS through provider-directed office-system interventions is critical to increase CRCS rates.

Objective: The purpose of this study was 1) to demonstrate the feasibility of adapting provider-directed office-system interventions developed by the Practice Partner Research Network (PPRNet) Translation of Research into Practice (TRIP) Quality Improvement (QI) Model for implementation in an independent, rural West Virginia primary care practice, and 2) to obtain estimates of variability for relevant outcome measures of the interventions as input for future, larger interventional studies to increase CRCS recommendation and rates.

Methods: Retrospective and prospective patient data from medical records and electronic medical records were extracted to compare pre- with post-intervention CRCS rates overall and by gender. A 3-month pre-intervention medical record review from October 2010 to January 2011 collected data for patients fitting the inclusion criteria to determine

patient characteristics and pre-interventional CRCS rates. Provider-directed office-system interventions were implemented, including site visits, academic detailing, best practice interventions, participatory planning, and electronic medical record reminders. Post-intervention data were collected from October 2011 to January 2012. Comparison of pre- and post-data was used to determine the effect of the interventions on CRCS recommendation and rates. After the three-month post-intervention data collection period, office staff participated in a focus group interview. The PPRNet TRIP QI Model was used as a framework to assess use of "best strategies" and the process of change. Categorical pre- and post-interventional data were compared using chi-square tests and logistic regression modeling.

Results: The pre-intervention CRCS status/completion for this practice was lower (4.3%) than the annual West Virginia average (56.6%). One month following study completion, CRCS status/completion increased to 36.2% ($p < 0.000$). Also, the CRCS recommendation rate rose from 4.3% to 42.1% ($p < 0.018$). No significant differences were found between gender and CRCS recommendation or status.

Conclusion: This study demonstrated the feasibility of implementing of the PPRNet TRIP QI Model in a rural, independent primary care setting. In addition, these results provided statistically significant indications that CRCS rates will increase after implementation of this model.

INTRODUCTION

In the United States, colorectal cancer (CRC) is the third leading cause of cancer-related deaths in men and women (American Cancer Society, 2012). Based on data from 2003 to 2007, West Virginia has the highest CRC death rate in the nation (21.0 per 100,000 for WV versus 17.6 per 100,000 nationally) (U.S. Cancer Statistics Working Group, 2010). Several risk factors and disparities contribute to West Virginians' overall risk for CRC. Obesity, physical inactivity, older age, as well as higher poverty rates, lower educational levels, lower socioeconomic status, and lack of public transportation compound the population's vulnerability (Behringer & Friedall, 2006; Coyne, Demian-Popescu, & Friend, 2006; Hansen & Resick, 1990; Kaiser Family Foundation, 2009; Lengerich et al., 2004; Lyttle & Stadelman, 2006). These facts are especially disheartening because CRC is preventable and curable with early diagnosis and treatment (American Cancer Society, 2010, 2012).

The existence of several versions of CRCS guidelines have caused some confusion for patients and providers, thus contributing to lower CRCS rates (Haas et al., 2007; Klabunde et al., 2003; Vernon et al., 2004; Wei, Ryan, Dietrich, & Colditz, 2005). Other patient barriers to CRCS are also significant: lack of provider recommendation, low health literacy, embarrassment, fear, inadequate insurance, financial obstacles, perception of low risk, previous negative medical experiences of family or friends, and distrust of the health care system (Fyffe, Hudson, Fagan, & Brown, 2008; Green & Kelly, 2004; Guessous et al., 2010; Klabunde, et al., 2003; Vernon, et al., 2004). Provider barriers to CRCS guideline adherence include patient comorbidities, patient refusal, provider forgetfulness, lack of time, other health priorities, and lack of reminders and tracking systems (Guerra et al., 2007; J. Zapka, 2008).

In an effort to clarify confusion and increase CRCS rates, CRCS guidelines have been developed by several national organizations. The most current recommendation set forth by the U.S. Preventive Services Task Force (2008) is for all persons age 50 to 75 to undergo fecal occult blood testing (FOBT) annually, sigmoidoscopy every 5 years, or colonoscopy every 10 years (U.S. Preventive Services Task Force, 2008). Despite the numerous patient and provider barriers to CRCS, the most influential factor determining adherence to the CRCS guidelines is provider recommendation (Beydoun & Beydoun, 2008; Guessous, et al., 2010; Klabunde, Lanier, Breslau, Zapka, & et al., 2007; Levy, Dawson, Hartz, & James, 2006; Sarfaty & Wender, 2007; Seef, Nadel, Klabunde, & et al., 2004; Subramanian, Klosterman, Amonkar, & Hunt, 2004). Yet, due to those barriers, providers often miss CRCS opportunities for their patients (Sabatino, Harbarta, Baron, Coates, & et al., 2008; J. G. Zapka & Lemon, 2004).

The literature indicates that combining multiple provider-directed with office-system-directed interventions in the primary care setting shows the most potential to increase CRCS rates (Lane, Messina, Cavanagh, & Chen, 2008; Ornstein, Nemeth, Jenkins, & Nietert, 2010; Ornstein et al., 2008; J. Zapka, 2008). Although most previous research has not incorporated the use of a clearly articulated theoretical framework, a 2010 study by Ornstein, Nemeth, Jenkins, and Nietert explained how to implement the PPRNet TRIP QI Model to increase CRCS rates. This model, grounded in complexity science theory and microsystems theory, was developed specifically to utilize clinical guidelines to drive interventional improvements using a provider-directed office-system approach (Feifer & Ornstein, 2004; Nemeth, Feifer, Stuart, & Ornstein, 2008; Nemeth, Nietert, & Ornstein, 2009). Prioritizing performance, staff involvement, system redesign,

patient activation, and enhanced use of EMR tools were the 5 main concepts driving quality improvements in this model (Feifer et al., 2007). In addition, seven steps in the change process were incorporated within the model: (1) vision with clear goals; (2) team involvement; (3) enhanced communication systems; (4) developed staff knowledge; small, incremental steps; (6) EMR assimilation into practice; and (7) feedback within a culture of improvement. This model (Figure 1) has proven to be effective at increasing CRCS rates within the Practice Partner Research Network (PPRN) (Nemeth, et al., 2009; Ornstein, et al., 2010). To determine its potential within an independent, rural West Virginia primary care practice, this model provided the guiding framework for this pilot study.

The purpose of this study was to demonstrate the feasibility of implementing provider-directed office-system interventions developed by the PPRNet TRIP QI Model for implementation in an independent, rural West Virginia primary care office setting. A secondary goal was to obtain estimates of variability in the CRCS outcome measures pre- and post-intervention as input for future, larger interventional studies to increase CRCS recommendations and rates. These data were also examined for any gender differences in relation to CRCS completion. Based on the evidence acquired in the review of the literature, the PPRNet TRIP QI Model offers the most promise to increase CRCS rates in this West Virginia primary care office setting.

METHODOLOGY

To determine the feasibility of adapting provider-directed office-system interventions within the PPRNet TRIP QI Model to increase CRCS rates in a rural, independent West Virginia primary care practice, this study used a simple, interrupted

time series pre-post design to collect pre- and post-intervention medical record data. Additionally, to demonstrate the feasibility of the proposed interventions (EMR assessment and feedback, site visits, participatory planning, an EMR reminder system, academic detailing, and best practice dissemination) and evaluate the preliminary results of the interventions, a post-interventional focus group interview was conducted with the office staff. Medical record data were collected to compare pre- and post-intervention CRCS rates by fecal occult blood testing (FOBT), flexible sigmoidoscopy (FS), and colonoscopy (C) for men and women between the ages of 50 and 75. Primary study outcomes were factors assessing the implementation of the PPRNet TRIP QI Model in the West Virginia rural, independent primary care setting-; secondary outcomes were CRCS rates. It was hypothesized that the implementation of the PPRNet TRIP QI Model with provider-directed office-system interventions would be shown as feasible, evidenced by the feedback from the office staff focus group interview and monthly PI observations. It was also hypothesized that, upon successful implementation of the model and interventions, early indicators would demonstrate an increase in post-interventional CRCS rates. Prior to implementation, Institutional Review Board approval was obtained from the Medical University of South Carolina.

Setting and Sample

This study was conducted in a rural, independent West Virginia primary care office setting that provides health care in a medically underserved area. There was no recruitment of patients; the clinical and office staff members of one practice were recruited to participate in this pilot study. Approaches to CRCS were undertaken by the office staff (n=10), who were the target of the interventions.

Based on patient data from the previous calendar year, a total of approximately 1,570 patients between the ages of 50 and 75 years- old were treated in the office. Patients were typically seen every 2-3 months. It was estimated that it was feasible to collect data on 400-500 patients per group. Using a two group continuity-corrected Chi-square test with 400 patients per group, there was approximately 80% power to detect a difference in proportions, assuming that 60% of patients in the prospective group will have CRCS, compared to 50% of patients in the retrospective group (odds ratio = 1.5), α = 0.05 (Type I error rate, two-sided test).

All patients between the ages of 50 and 75 years- old were included to be flagged in the EMR and screened. Patients were included in the study if they met the inclusion criteria of: (1) active adult patients with a progress note, lab, or consultation record within the last year; (2) between the ages of 50-75 years; (3) without any history of CRCS; and (4) requiring updated CRCS according to the recommended time-frames for FOBT, flexible sigmoidoscopy, or colonoscopy. Following the USPSTF CRCS recommendations, providers were coded as adherent if they documented recommendation of some form of CRCS within the EMR, and patients were coded as adherent if there was some form of CRCS test documentation within the EMR. Patients without any form of EMR documentation of CRCS recommendation or documented patient refusal were labeled non-adherent to CRCS guidelines.

Pre/Post-intervention Audit & Feedback

To determine patient characteristics and pre-interventional CRCS rates, a 3-month retrospective medical record review was conducted for the time period of October 2010 to January 2011. Data were also collected prospectively from October 2011 through

January 2012 to compare similar time periods and minimize any potential seasonal variations. All pre-intervention data were collected from medical records, and all post-intervention data were collected through the EMR system. The EMR system was implemented in the office in August 2010 and did not contain any information regarding CRCS. Thus, the EMR reminder system was used as one of the main interventions to increase CRCS. A one-month follow-up period was included for both pre/post-interventional groups to allow sufficient time for CRCS tests to be completed. The PI trained one office staff member as a research assistant to collect all pre- and post-interventional data. The research assistant was then responsible for de-identifying all data and entering it into an encrypted laptop computer. When not in use, all data and the laptop were kept secured in a locked filing cabinet.

Interventions: Site Visit, Academic Detailing, Participatory Planning, Best Practice Dissemination, EMR Assessment and Feedback, and EMR Reminder

The principal investigator (PI) made an initial site visit and met with all office staff present to initiate the provider-directed office-system interventions. First, academic detailing was initiated to increase CRCS knowledge and reinforced the need for change in the office setting. This discussion also presented best practice interventions utilized in the literature and the concept of quarterly EMR assessment and feedback. The concept of participatory planning was introduced to encourage collective responsibility in establishing a new practice vision and goals to increase CRCS. In addition, all office staff members were taught about the EMR CRCS reminder that was programmed into the EMR system to pop up for patients meeting the inclusion criteria. Further, office staff participatory planning took place to decide the implementation process and flow of

assimilating the EMR CRCS reminder into practice. Upon closure of the site visit, the PI planned another office staff meeting three months later. This meeting was intended to provide EMR assessment and feedback data and to conduct a focus group interview to evaluate the use of the "best practice" implemented by the staff. The PI was available for questions by phone and made monthly site visits to provide support. Interventions were immediately launched.

Focus Group Interview with Office Staff

After 3 months of implementation, an office staff focus group interview was conducted to evaluate each intervention improvement strategy used. At this time, quarterly EMR audit and feedback, reinforcement of academic detailing, participatory planning, and best practice dissemination were completed. This session was digitally recorded and subsequently evaluated by the PI and a co-investigator, using the PPRNet TRIP QI Model as a framework to identify how the process of change was implemented.

STATISTICAL ANALYSES

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 20.0. The only missing data for the pre- and post- interventional groups was pre-intervention education level, which could not be determined retrospectively as it had not been routinely collected as part of the medical record. All other demographic data (age, race, ethnicity, gender, employment status, and insurance status) were collected and reported for both the pre- and post-interventional groups. Descriptive statistics were used to characterize the study sample while chi-square tests were used to compare outcomes for the pre- and post-intervention groups. Logistic regression was used to examine the relationship between CRCS results and the intervention (pre/post), adjusted for

covariables such as age, gender, employment, and insurance. *P* values of .05 or less were considered to be significant.

QUALITATIVE ANALYSIS

A focus group interview of the office staff was used in conjunction with the pre- and post-interventional quantitative data to gain a better understanding of how the PPRNet TRIP QI Model was implemented. In addition, the focus group interview allowed for closer examination of each interventional strategy tried and used by the office staff through open-ended questions designed to elicit relevant details and office staff perceptions of this process of change. The focus group interview was also used for continued implementation of the PPRNet TRIP QI Model. EMR assessment and feedback was provided, academic detailing was continued, and time was allotted for participatory feedback and best practice dissemination among the office staff.

The focus group interview was scheduled during a lunch break, when all office staff members were present to reduce work hour conflicts. The office staff was informed of the purpose of the focus group interview, and signed informed consent was obtained from each staff member. The focus group interview was digitally recorded and transcribed. Once transcript verification was performed, the original voice recordings were deleted from the digital recorder. Focus group transcriptions were kept secure in a locked cabinet. No personal identifiers were used in the transcripts to maintain the anonymity and confidentiality of the office staff members. Each office staff member was given a $25 grocery/gas card to thank them for their participation.

QUANTITATIVE RESULTS

Office Staff Demographic Characteristics

The office staff (n= 9) was overwhelmingly female (89%). One office staff member called in sick the day of the focus group interview. Age ranged from 21-50 years- old with a mean of 35 years- old. The office staff was 100% Non-Hispanic. Seventy-eight percent of the staff identified themselves as white and 22% as black. Education level revealed that 11% had a high school degree, 56% had attended some college, 11% had earned a bachelor's degree, and 22% held a master's/doctoral/professional degree.

Pre/Post-Intervention Group Characteristics Using Chi-Square

Data were collected on 599 of 1,176 patients (50.9%) in the pre-intervention group and 819 patients (100%) in the post-intervention group with a total sample size of n=1,418. Detailed pre/post-intervention group characteristics of patients are illustrated in Table 1. Statistically significant differences between groups were found for age, employment, and insurance status. More patients in the pre-intervention group were between the ages of 50- and 64 years-old (66.6%) compared to 58.4% in the post-interventional group ($p < 0.002$). Over half (50.9%) of pre-intervention patients were unemployed compared to only 16.2% of post-intervention patients ($p < 0.000$). Differences in insurance status also existed between the groups with 66.1% of pre-interventional patients privately insured compared to 47% of post-interventional patients ($p < 0.000$). The percentage of patients with Medicare increased from 29.9% pre-intervention to 40.8% post-intervention. The number of self-paying patients also increased from 1.2% pre-intervention to 10.7% post-intervention. Ethnicity was homogenous for both groups; no Hispanic or Latino/a patients were identified. Unfortunately, education level could not be compared due to the lack of sufficient data in the pre-intervention group and collection of education data for only 43% of the post-intervention group.

Pre/Post-Intervention Group CRCS Characteristics Using Chi-Square

The CRCS characteristics for the pre- and post-intervention groups are listed in Table 2. The documentation of CRCS recommendation rose from 4.3% to 42.1% ($p<0.018$). More patients were engaged in CRCS discussion as a result of the strategic interventions implemented. In the pre-intervention group, 38.4% had no documentation of CRCS recommendation compared to 32.4% of patients in the post-intervention group. Refusal rates were 4.3% in the pre-intervention group and 6.7% in the post-intervention group. The number of patients up-to-date with CRCS completion increased from 4.2% in the pre-intervention group to 36.2% in the post-intervention group ($p<0.000$).

Chi-Square Results between Variables and CRCS Recommendation/Status

Pre-Intervention

The findings for the pre-intervention group showed statistically significant associations between the documentation of CRCS recommendation and age ($p<0.019$), employment status ($p<0.017$), and insurance status ($p<0.052$). Patients between 65- and 75 years old were more likely to have completed some form of CRCS (55%) compared to 50- and 64 year- olds (51.9%). In addition, patients between 50- and 64 years old were more likely to have no documented discussion of CRCS recommendation (41.6%) in their medical records compared to 32% of patients between 65- and 75 years old. These age differences may be attributed to the variance of insurance; the 65-75 year-old patients having Medicare as their primary insurance and the 50-64 year-old patients having another form of insurance or no insurance. Patients having some form of insurance (private 62.8%, Medicaid 3.8%, and Medicare 32.8%) had statistically significant higher CRCS recommendation rates than patients without insurance (0.6%). Having some form

of health insurance had a positive effect on CRCS recommendation rates. Interestingly, retired (10.1%) and part-time (1.6%) working patients had lower CRCS rates than unemployed (54.3%) or full-time working (34.1%) patients. No statistically significant relationships were found between demographic characteristics and documentation of CRCS status/completion.

Post-Intervention

The findings for the post-intervention group showed statistically significant associations between the documentation of CRCS recommendation and education ($p<0.001$), employment status ($p<0.02$), insurance ($p<0.010$), and provider ($p<0.006$). The education data collected represented only 42.7% of the post-intervention group, and this factor must be taken into consideration. Patients with more education were more likely to have consented to some CRCS tests. Working (44.3%) and retired (43.2%) patients were more likely to have received a CRCS recommendation than unemployed (12.5%) patients. The cost of screening continues to be a factor in CRCS. Patients with Medicare (48.7%) or private insurance (42.2%) were more likely to complete some form of CRCS than patients with Medicaid (1.9%) or no insurance (5.8%). Additionally, having insurance increases the probability of receiving a CRCS recommendation from a provider. The physician was more likely to discuss and order CRCS (85.5%) than the nurse practitioner (16.4%), and the physician's patients were more likely to follow through with completion of CRCS. An association between the documentation of CRCS status/completion and race was found in the post-intervention group ($p<0.030$). No screening tests were completed for 69% of blacks and 63.5% of whites.

Gender Differences

Table 3 illustrates the combined gender-specific CRCS characteristics. There was no significant statistical association between gender and CRCS recommendation (p=0.631) or gender and CRCS completion (p=0.482).

Table 4 illustrates gender-specific CRCS characteristics for both groups. The pre-intervention CRCS recommendation rate for men and women were 4.6% and 4.1% respectively, and rose to 43.8% and 40.7%, respectively, post-intervention. The rates of men and women up-to-date with documented CRCS test completion in the pre-intervention group were 3.1% and 5.3%, respectively. Of men, 34.6% and 37.7% of women were up-to date with documented CRCS test completion in the post-intervention group. Of the 166 men who received CRCS recommendation in the post-intervention group, 131 (79%) completed some CRCS test. Of the 179 women who received CRCS recommendation in the post-intervention group, 166 (92.7%) completed some CRCS test. Colonoscopy was the most utilized CRCS test for both groups. Among those who received any form of CRCS, all but 2 men and 3 women in the pre-intervention group and 1 man and 3 women in the post-intervention group had colonoscopies.

CRCS by Pre/Post Groups

Table 5 shows a summary of the logistic regression analyses. Logistic regression analysis was conducted with CRCS recommendation as the dependent variable, group pre/post as primary independent variable of interest, and age, gender, race, employment, and insurance as independent variables. Education and ethnicity were not included based on insufficient data and a homogenous sample, respectively. Individually, the only independent (adjustment) variables showing a statistically significant relationship with CRCS recommendation were employment (OR 0.5, $p < 0.000$, CI 0.4, 0.7) and insurance

(OR 3.2, $p < 0.000$, CI 1.9, 5.4). Having insurance and employment significantly and positively affected CRCS recommendation. In the full model including the pre/post group variable and the adjustment variables a statistically significant association with CRCS recommendation was found (OR 6.7, $p < 0.000$, CI: 4.6, 9.4). Patients in the post group were almost 7 times more likely to get CRCS recommendation compared to patients in the pre group, adjusting for demographic information. The various strategic interventions implemented within the PPRNet TRIP QI Model had a significantly positive effect on CRCS recommendation.

In addition, logistic regression analysis was conducted with CRCS completion as the dependent variable, group (pre/post) as primary independent variable of interest, and age, gender, race, employment, and insurance as the adjustment variables. In individual models, age, gender, and race were not significantly associated with CRCS completion. Employment was significantly related to CRCS status (OR 0.5, $p < .000$, CI. 0.3, 0.6). Similar to findings for CRCS recommendations, in the full model with the pre/post group variable as primary independent variable of interest, patients in the post group were more than 12 times more likely to have CRCS completion compared to their counterparts in the pre-group (OR 12.6, $p < 0.000$, CI: 8.3, 19.1). The various strategic interventions implemented within the PPRNet TRIP QI Model had a significantly positive effect on CRCS completion.

CRCS by Gender

Logistic regression was conducted with gender as the independent variable and CRCS recommendation as the dependent variable showing no statistically significant relationship (OR 1.1, $p < 0.560$, CI: 0.8, 1.4). Logistic regression was then repeated with

gender and CRCS status, yielding no statistically significant relationship (OR 1.1, p < 0.428, CI: 0.9, 1.4).

QUALITATIVE RESULTS

To best organize and analyze qualitative results, the PPRNet TRIP QI Model was used as the thematic framework. Results are presented according to the components within the process of change: vision with clear goals, team involvement, enhance communication systems, develop staff knowledge in small, incremental steps, EMR assimilation into practice, and feedback within a culture of improvement. Table 6 provides some office staff excerpts that show comments about the various components in the process of change within the PPRNet TRIP QI Model.

In congruence with the PPRNet TRIP QI Model, the process of change was initiated upon the first PI site visit mid-September 2011. Upon office staff acceptance and commitment to practice changes that could increase CRCS rates, several interventions were implemented. The initial site visit entailed academic detailing, best practice dissemination, assimilation of an EMR reminder system, and participatory planning of specific strategies to use.

Together, all office staff members agreed upon the vision of increasing CRCS rates as the clear objective. In order to maximize CRCS, the office staff worked as a team to decide how best to proceed by communicating on a daily basis about the division of responsibilities and the flow of information.

The office staff tried to make the transition smoothly, taking small steps and making small changes when problems materialized. For example, a few patients were upset if they were asked about CRCS again at the front desk. Based on this negative

feedback from patients, the strategies changed to ease the comfort of patients and office staff and to improve flow.

There was clear evidence of office staff empowerment and commitment to the process of change. Office staff members provided valuable feedback to continue improvement of CRCS rates. A more frequent EMR reminder for those patients who refused CRCS was suggested as a means to remind providers to revisit the topic at a subsequent office visit. Another suggestion focused on whether the EMR reminder could be used to track results to ensure complete and up-to date EMRs. Sensing the value of this new process of change, the office staff also collectively decided to start using EMR reminders for other screening tests (i.e. pap smears, PSA, and mammograms) with discussion to add other tests in the future.

The office staff used all the specific strategies geared to prioritize performance. The office staff was committed to the practice changes and discussed ways to improve flow on almost a daily basis until problems were resolved. The opportunity to have quarterly practice meetings was not fully implemented due to the study's short time frame. However, the value of a quarterly practice meeting was evident in the staff's exchange of communication and their desire to know CRCS improvement rates for the quarter. The use of FOBT or iFOBT was attempted by both providers, but with less than positive results. The few patients who took the FOBT cards never returned them.

The office staff successfully incorporated all three specific strategies related to delivery system design. The majority of patients have been seen on a regular basis, every 2-3 months, for routine health maintenance visits. The utilization of CRCS EMR

reminders brought attention to clearly documenting CRCS status for all patient visits and immediately created standing orders upon patient agreement, to proceed with testing.

The EMR reminder tool was implemented with relative ease. Patients between the ages of 50 and 75 years old, without a history of CRC, and seen within the past year were flagged for CRCS and the patients' EMRs were updated with CRCS information.

Patient education and activation were conducted as CRCS education materials provided to all patients meeting the inclusion criteria. Continued effort was acknowledged and follow-up needed for those patients who initially refused CRCS. Follow-up with patients to ensure completion of CRCS test was also addressed. Continued participatory planning and feedback will be needed to address these deficits.

The overall implementation and application of the PPRNet TRIP QI Model was a positive experience for this office staff. In summary, the EMR reminder system was the guiding force to increase CRCS and the easiest to use. Many of the specific strategies occurred naturally as an extension from the EMR reminder system. The main difficulty was dealing with some irritated patients who refused CRCS. A second difficulty was that most gastroenterologists and specialists did not routinely send the colonoscopy reports back. The office staff adapted well to the process of change and was able to follow through the steps to utilize and modify specific strategies that maximized the ease and benefits of implementation. To continue successful CRCS outcomes, the office staff should adhere to the interventions and strategies now in place and incorporate methods of follow-up on patients who have refused testing or who have pending CRCS tests.

DISCUSSION

This study confirmed the feasibility of implementing the PPRNet TRIP QI Model in an independent, rural primary care practice. Using a provider-directed office-system

approach with EMR reminder system proved to be replicable and effective to increase CRCS. The qualitative results confirmed that the process of change within the PPRNet TRIP QI Model was fully implemented once initial kinks were worked through. Daily discussions took place for the first few weeks to reach a level of comfort and smooth transition. The most effective intervention was found to be the EMR reminder system. This value of the EMR system was found in previous studies (Klabunde, Lanier, Meissner, Breslau, & Brown, 2008; Nemeth et al., 2007). Early in the implementation process, the office staff recognized the positive effect of the interventions and included other screening tests in the EMR system, such as mammograms, pap smears, and PSAs. Furthermore, the office staff asked for additional EMR reminders to notify for screening test results to ensure completion and when the screening test needed repeating based on guideline recommendations. The gradual process of change took a team approach, improved office staff communication, increased staff knowledge, and used feedback on a daily basis to improve patient flow.

Additionally, this study provided preliminary indications of effectiveness for the PPRNet TRIP QI Model to increase CRCS recommendation and CRCS completion. The documented CRCS recommendation rate increased from 4.3% to 42.1% ($p < 0.018$), and the percentage of patients up-to-date with CRCS completion increased from 4.3% to 36.2% ($p < 0.000$) over a three-month period. These findings are consistent with previous research that also established the significance of a provider-directed office-system approach to increase CRCS (Ornstein, et al., 2010; Steinwachs, Allen, Barlow, & et al., 2010).

When patients receive CRCS recommendation, they were more likely to proceed and complete some form of CRCS. Of the 345 patients who received CRCS recommendation, 298 (86%) completed a CRCS test. The percentage of patients without documented CRCS recommendation dropped from 38.4% to 32.4%. An increase in refusal rate (4.3% to 6.7%) may be a reflection of the increased CRCS discussion rate. With more dialogue occurring between patients and providers, the patients' CRCS preferences, positive or negative, were documented.

Though these results are only preliminary indications of effectiveness, they are consistent with previous study results that showed significant improvement in CRCS recommendation and rates when implementing the same PPRNet TRIP QI Model (Ornstein, et al., 2010). Ornstein et al's (2010) two-year randomized trial was conducted in 32 primary care settings across the U.S. The intervention practices showed significant improvements in CRCS completion rates compared to the control practices.

There are several limitations to this study, many of which are related to the design. This pilot study was designed to assess the feasibility of replicating the PPRNet TRIP QI Model in a rural, independent primary care practice in a 4-month time span. While the study proved the feasibility, it may not have allowed sufficient time for patients in the post-intervention group to complete a CRCS test. Therefore, the post-intervention results are preliminary signals of CRCS status/completion and may be higher than what is here reported. In addition, the demographic variable of education could not be thoroughly examined due to the lack of documentation. The lack of documentation of pre-intervention CRCS recommendation and CRCS completion is another potential

factor. It could be higher than reported, but the EMR provided a concrete platform for documentation of these data.

Due to the lack of resources for this unfunded study, only 50.9% of eligible patients' were collected for the pre-intervention data, contributing to unequal pre- and post-intervention sample sizes. The pre-intervention sample was randomized in the master list and the data collector followed that master list. Pre-intervention data were collected from medical records, a process that proved to be very labor intensive and time consuming. Only one employee was trained to collect data, which limited data collection and did not allow for periodic validity testing. Further, an interrupted time-series pre-post design was used. Ideally, two practices could have been used to randomly assign one practice as the control group and the other as the intervention group. Funding could have helped to train another data collector to retrieve all pre-intervention data to make equal size pre- and post-intervention groups.

The Hawthorne Effect must also be taken into consideration, as the office staff members were acutely aware of what was being studied. This effect could be minimized in the future with a randomized multi-practice study. Furthermore, because the study was limited to one site in West Virginia and used a convenience sample, the results may not be generalizable to a larger population. The sample was overwhelmingly White (97%) and Non-Hispanic (100%). While these statistics closely reflect the entire West Virginia population, where 94.4% of the population is White (not of Hispanic origin), 3.7% Black, and 2.1% Pacific Islander-Asian, American-Indian , Alaska Native, and Hispanic or Latino, the sample does not reflect the U.S. population (U. S. Census Bureau, 2009).

Strengths of this study included EMR randomization of the pre-intervention sample, and larger sample sizes for both pre- and post-intervention groups. Focus group interview provided additional, supportive information about the application of the PPRNet TRIP QI Model.

Chi-square analyses revealed that there were some significant differences between the pre- and post-intervention groups by age group ($p<0.002$), employment status ($p<0.000$), insurance status ($p<0.000$), and provider ($p<0.017$). Variations in employment and insurance status are not that uncommon in rural West Virginia, as many of these patients work in the coal mining industry and face seasonal hiring and layoffs due to coal demand. This unpredictability and the physical demands in the coal mining industry also lead to early retirement, which is another potential factor. The difference in providers may be due to the fact that the nurse practitioner usually sees more walk-in patients with more acute problems than the physician. Additionally, the nurse practitioner was a new graduate hired in September 2010. The physician sometimes followed up with the more complex patients that the nurse practitioner saw, which could further contribute to the differences seen.

Both chi-square and logistic regression analyses confirmed the significant relationship between employment and insurance with CRCS recommendation and CRCS completion. In this population, employment is most often associated with the receipt of health insurance, which makes CRCS more affordable for patients. Part-time jobs often lack health insurance and paid time off to complete screening tests. Retired patients may not perceive the risk of CRC as serious. These results support previous research that showed patients with health insurance are more likely to have had some form of CRCS

(Beydoun & Beydoun, 2008; Daly, Levy, Merchant, & Wilbur, 2010; Klabunde, et al., 2008; Steinwachs, et al., 2010).

CONCLUSION

The results from this study provided evidence demonstrating the feasibility of implementing the PPRNet TRIP QI Model in an independent, rural, West Virginia primary care setting. This model was found to be applicable and produced positive results demonstrated by an increase in CRCS recommendation and completion rates. The results also supported that women had a higher incidence of CRC than men in West Virginia.

Future recommendations for research include expanding to multiple rural, independent primary care sites in West Virginia, using randomization of sites to intervention or control, and conducting the study with a longitudinal design to allow more time for completion of CRCS tests as well as to include those patients requiring follow-up for continued CRCS according to the USPTFS CRCS screening guidelines. West Virginia is a state with multiple disparities, and cost and insurance are important factors to consider. The only systematic review examining the relationship between cost and CRCS estimated the cost to be $10,000 to $25,000 per year of life saved compared to no screening (Pignone, Saha, Hoeger, & et al., 2002). Future studies should include closer examination of the cost, reimbursement, and value of the various CRCS tests from patient and provider perspectives. Reimbursement rates vary by test and by insurance company, which may cause undue influence. The role of nurse practitioners and physician assistants in CRCS requires more investigation as well. Finally, the concept of including other cancer screening tests with CRCS to improve cancer screening outcomes statewide is a realistic endeavor. This concept was identified and applied early by the office staff

members within this study, demonstrating motivation and efficacy of applying the PPRNet TRIP QI Model to other screening tests.

Table 1. Demographic Characteristics of Sample Pre- and Post-Interventions

Variables	Pre-Intervention (n=599)	Post-Intervention (n=819)	Chi Square and p value
Age, mean (SD)	62 (6.6)	63 (7.11)	
Age, n (%)			
50-64	399 (66.6)	478 (58.4)	$\chi^2 = 9.9$
65-75	200 (33.4)	341 (41.6)	$p < 0.002$*
Gender, n (%)			
Male	261 (43.6)	379 (46.3)	$\chi^2 = 1.0$
Female	338 (56.4)	440 (53.7)	$p = 0.312$
Race, n (%)			
American Indian or Alaska Native	0 (0.0)	1 (0.1)	
Asian	1 (0.2)	0 (0.0)	$\chi^2 = 5.6$
Black or African-American	9 (1.5)	29 (3.5)	$p = 0.062$
White	589 (98.3)	789 (96.3)	
Ethnicity, n (%)			
Non-Hispanic Latino/a	599 (100)	819 (100)	**
Education, n (%)			
GED/High School Graduate	0 (0.0)	376 (45.9)	
College	2 (0.4)	93 (11.4)	***
Not Documented	597 (99.6)	350 (42.7)	
Current Employment Status, n (%)			
Part-time	8 (1.3)	42 (5.1)	
Full-time	230 (38.4)	317 (38.7)	$\chi^2 = 268.6$
Unemployed	305 (50.9)	133 (16.2)	$p < 0.000$*
Retired	56 (9.3)	327 (39.9)	
Insurance Status, n (%)			
Private Insurance	369 (66.1)	385 (47)	
Medicaid/Medicaid Disability	17 (2.8)	13 (1.6)	$\chi^2 = 86.5$
Medicare	179 (29.9)	334 (40.8)	$p < 0.000$*
No insurance/Self-pay	7 (1.2)	87 (10.7)	
Provider, n (%)			
Physician	465 (77.6)	682 (83.3)	$\chi^2 = 8.2$
Nurse Practitioner	133 (22.2)	137 (16.7)	$p < 0.017$*

*= $p < 0.05$

**= variable constant, unable to calculate

***= insufficient data to calculate

Table 2. CRCS Characteristics of Sample Pre- and Post-Interventions

Variables	Pre-Intervention (n=599)	Post-Intervention (n=819)	Chi Square and p value
Documentation of CRCS Recommendation, n (%)			
Not Discussed	230 (38.4)	265 (32.4)	
Discussed and Refused	26 (4.3)	55 (6.7)	$\chi^2 = 5.6$
Discussed and Test Ordered	26 (4.3)	345 (42.1)	$p < 0.018$*
Done Previously	317 (52.9)	154 (18.8)	
Documentation of CRCS Test Completion, n (%)			
FOBT	0 (0.0)	2 (0.2)	
Flexible Sigmoidoscopy	0 (0.0)	2 (0.2)	$\chi^2 = 201.5$
Colonoscopy	26 (4.3)	294 (35.9)	$p < 0.000$*
No Screening Completed	573 (95.7)	522 (63.7)	

*= $p < 0.05$

Note: P values were obtained for comparison of discussed or not discussed for CRCS recommendation and test completed versus test not completed for CRCS test completion.

Table 3. Gender Specific CRCS Characteristics

Variables	Male n=640	Female n=778	Chi-Square & p-value
Documentation of CRCS Recommendation n, (%)			
Not Discussed	224(35)	268(34.4)	χ^2=2.6
Discussed and Refused	37(5.8)	47(6.1)	p=0.631
Discussed and Test Ordered	178(27.8)	193(24.8)	
Done Previously	201(31.4)	270(34.7)	
Documentation of CRCS Test Status/ Completion in Medical Records n, (%)			
FOBT (1 year)	0(0)	2(0.3)	χ^2=3.5
Flexible Sigmoidoscopy (5 years)	1(0.2)	1(0.1)	p=0.482
Colonoscopy (10 years)	138(21.6)	181(23.3)	
No Screening Completed	500(78.1)	594(76.3)	

Table 4. Gender Specific CRCS Characteristics Pre- and Post-Intervention

Variables	Pre-Intervention Male (n = 261)	Pre-Intervention Female (n = 338)	Chi Square and p-value (n = 599)
Documentation of CRCS Recommendation, n (%)			
Not Discussed	107 (41)	123 (36.4)	
Discussed and Refused	11 (4.2)	15 (4.4)	$\chi^2 = 1.6$
Discussed and Test Ordered	12 (4.6)	14 (4.1)	$p = 0.670$
Done Previously	131 (50.2)	186 (55)	
Documentation of CRCS Test Completion, n (%)			
FOBT	0 (0.0)	0 (0.0)	
Flexible Sigmoidoscopy	0 (0.0)	0 (0.0)	$\chi^2 = 1.8$
Colonoscopy	8 (3.1)	18 (5.3)	$p = 0.178$
No Screening Completed	253 (96.9)	320 (94.7)	

Variables	Post-Intervention Male (n = 379)	Post-Intervention Female (n = 440)	Chi Square and p-value (n = 819)
Documentation of CRCS Recommendation, n (%)			
Not Discussed	117 (30.9)	145 (33)	
Discussed and Refused	26 (6.9)	32 (7.3)	$\chi^2 = 1.0$
Discussed and Test Ordered	166 (43.8)	179 (40.7)	$p = 0.909$
Done Previously	70 (18.5)	84 (19.1)	
Documentation of CRCS Test Completion, n (%)			
FOBT	0 (0.0)	2 (0.5)	
Flexible Sigmoidoscopy	1 (0.3)	1 (0.2)	$\chi^2 = 2.5$
Colonoscopy	130 (34.3)	163 (35.8)	$p = 0.479$
No Screening Completed	248 (65.4)	274 (62.3)	

Table 5. Summary of Logistic Regression Analyses

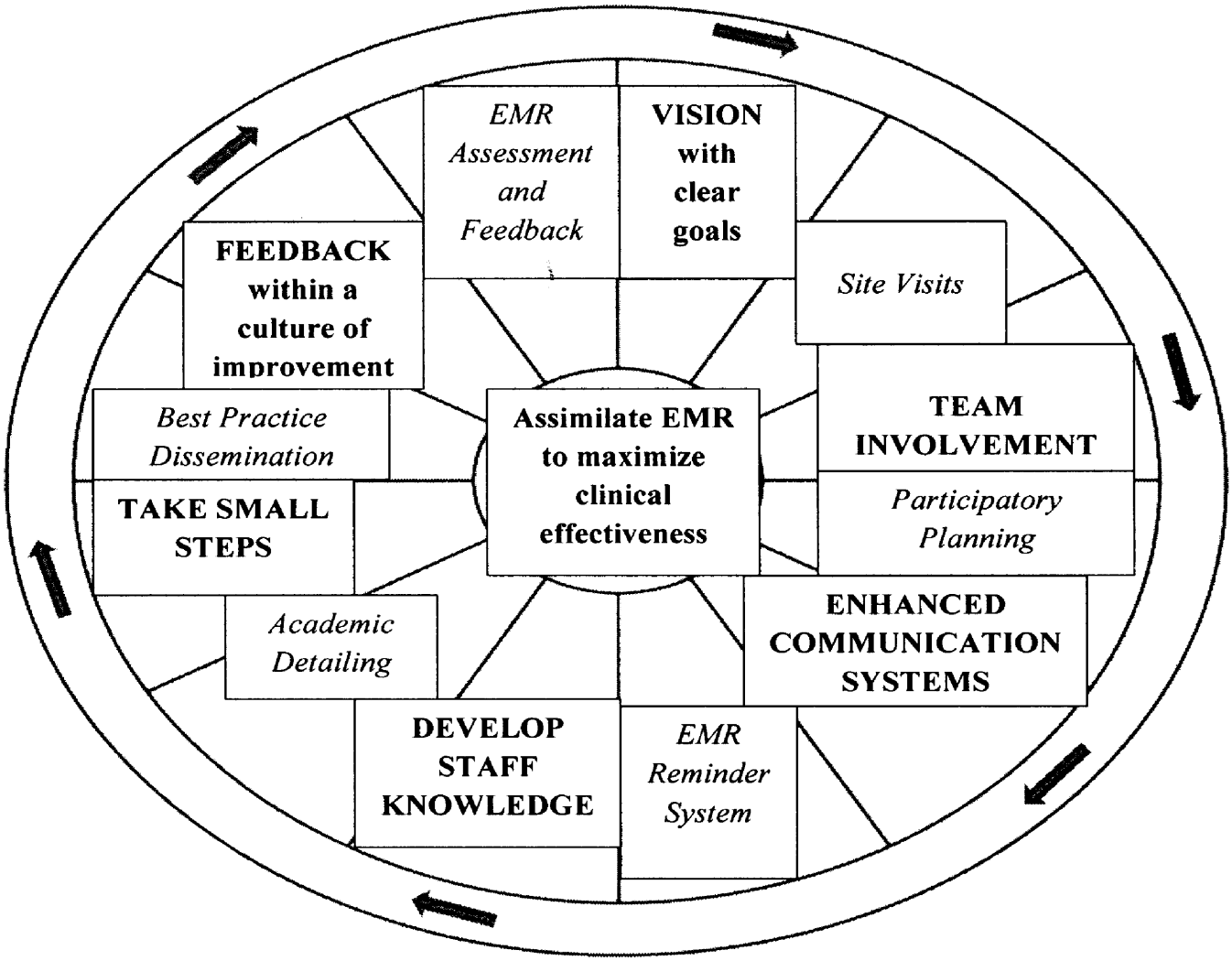
	Odds Ratio	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound	P-value
CRCS Recommendation				
Age	1.2	0.9	1.6	.137
Gender	1.1	0.8	1.4	.560
Race	0.9	0.4	2.0	.889
Employment	0.5	0.4	0.7	.000*
Insurance	3.2	1.9	5.4	.000*
Age + Gender + Race + Employment + Insurance	1.1	0.8	1.5	.667
Age + Gender + Employment + Insurance	1.1	0.8	1.5	.567
Pre/Post Group	6.7	4.8	9.4	.000*
CRCS Status/Completion				
Age	1.2	0.9	1.6	.138
Gender	1.1	0.9	1.4	.428
Race	1.0	0.5	2.2	.905
Employment	0.5	0.3	0.6	.000*
Insurance	1.5	0.9	2.3	.099
Age + Gender + Race + Employment + Insurance	1.3	0.9	1.7	.127
Age + Gender + Employment + Insurance	1.3	0.9	1.7	.128
Pre/Post Group	12.6	8.3	19.1	.000*

*=$p < 0.05$

Table 6. Focus Group Interview Excerpts Detailing Implementation of the Process of Change within the PPRNet TRIP QI Model

Vision with Clear Goals	*"I am anxious to see if we really got better!"* *"Maybe we need to implement this hospital wide? I think you'll help the patients."*
Team Involvement	*"One thing we did so that the patients do not have to go through explaining why they refused. Sometimes they can get angry, you know. So what we did, we had a clip board and a piece of paper on it and when I write declined, we know up in front not to open the subject again. We prefer going paperless, but that was necessary, I felt."* *"It saved a lot of drama."*
Enhanced Communication Systems	*"I think it was an everyday discussion because of trying to keep up and make sure we got the records, making sure that if we didn't have the records, then we had to get them or if we had to get them scheduled. So I think it actually was an everyday conversation in that sense, I think."* *"I like it (EMR reminder) because everybody can see it and what everyone has done. You can see what the other person said this week, and she can see it next week. She can see what was previously said. Also, it can let us know what providers did."*
Develop Staff Knowledge in Small, Incremental Steps	*"We had to learn how to do the alerts. But when we learned it, I find it more effective in detecting mammograms. We established it for people who need certain tests. I think it is very helpful."* *"I found myself doing more education with them and then ask if we could discuss this again at the next appointment."*
EMR Assimilation into Practice	*"I think the computer alerted us to the patients who did not have scopes in their records and then the medical assistance handed them the education material and I discussed it with them briefly. I just told them the statistics for West Virginia and the higher rate of cancer and asked them in the end if they are willing to proceed or not. From my end, then then things went to the front office and if I marked that the patient agreed, the front staff made the arrangements for the scope. If denied, we documented it."*
Feedback within a Culture of Improvement	*"Maybe have it (EMR reminder) pop up more than once a year. For those people that refuse, have it pop up more than once a year."* *"It would be helpful to have it (EMR reminder) pop up again to see if we have gotten the results. Then we wouldn't have to ask again if they got the test done. That we actually know if they followed through with the screening."*

Figure 1. Adapted with permission from Nemeth et al. (2008). Integration of Provider-Directed Office System Interventions into the PPRNet TRIP QI Model.



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CONCLUSION

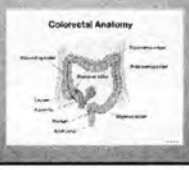
This dissertation consists of three manuscripts; (1) an integrative review and analysis of current provider strategies used to increase CRCS, (2) a description of the methodology utilizing the PPRNet TRIP QI Model, and (3) an analysis of the adaptation and effect of the PPRNet TRIP QI Model to increase CRCS in a primary care setting. The information presented within this dissertation creates the foundation for future, larger studies of implementing the PPRNet TRIP QI Model to increase CRCS in the rural, West Virginia primary care setting. The integrative review analysis of the various provider strategies established the foundation of the best theoretical framework and interventions studied and proven to increase CRCS in the primary care setting. The methodology was delineated within the second manuscript to outline the detailed process of implementing the PPRNet TRIP QI Model in a rural, West Virginia primary care setting. This pilot study demonstrated feasibility and provided preliminary signals that CRCS recommendation and screening rates will increase when the PPRNet TRIP QI Model is implemented. This model can fill the gap in research that identified the need for a systems approach to increase CRCS in primary care (Klabunde, et al., 2008; Sarfaty & Wender, 2007; Steinwachs, et al., 2010; U.S. Preventive Services Task Force, 2008). The model also delineates the process of change along with proven strategies to increase CRCS in the primary care setting.

APPENDIX Academic Detailing Power Point Presentation Outline

Slide 1

Colorectal Cancer Screening in Primary Care

Katherine Atassi, PhD(c), RN, OCN, NE-C
Medical University of South Carolina



Slide 2

A Call to Action: Prevention and Early Detection of Colorectal Cancer (CRC)

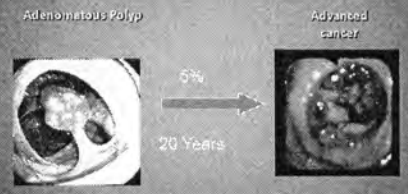
Slide 3

Colorectal Cancer (CRC) Facts

- 3rd most commonly diagnosed cancer in U.S.
  - 142,570 new cases in 2010
- 3rd most common cause of death in U.S.
  - 51,370 estimated deaths in 2010
- Risk Factors: ≥50 years-old, diet high in fat and low in fiber, excessive alcohol consumption, physical inactivity, obesity, smoking, and family history of CRC

Slide 4

Natural History



Average time for progression of polyp to cancer 10-15 years

Slide 5

Screening = Prevention & Early Detection

Prevention = polyp removal ⇒
Decreased Incidence of cancer

Early Detection ⇒
Decreased Mortality from cancer

Slide 6

Colorectal Cancer Screening Facts

- Early detection and prevention through CRCS critical to reduce morbidity and mortality rates
- **West Virginia** has highest death rate in the nation (2003-2007) from CRC
- National CRCS rate 66.6%
- WV CRCS rate 56.6%
- WV risk factors: obesity, physical inactivity, poor dietary choices, and older age

Slide 7

5 Key Points

- Colorectal cancer can be **prevented**
- Screening reduces mortality from CRC
- All persons aged 50 years and older should begin regular screening
- High-risk individuals may need to begin screening earlier
- Insufficient evidence to suggest a best test; *any screening test is better than no screening test*

Slide 8

CRCS Guidelines

U.S. Preventative Task Force (2008)

- Adults age 50 to 75 to undergo either
  - Fecal occult blood testing (FOBT) or fecal immunochemical testing (FIT) annually
  - Flexible sigmoidoscopy every 5 years
  - Double-barium enema every 5 years
  - CT colonography (virtual colonoscopy) every 5 years
  - Colonoscopy every 10 years
  - Fecal DNA at unspecified intervals

Insufficient evidence for "best" test

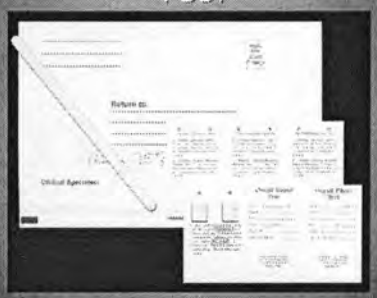
Slide 9

FOBT testing

- Three-card at home FOBT
  - Supported by trial data (Minn, 1993; Hardcastle, 1996; Kronborg, 1996)
- In-Office FOBT (not recommended)
  - Commonly done in practice (Nadel, 2005; 2007)
  - No studies on CRC incidence or mortality
  - Single Digital Rectal exam in office decreases accuracy of the test

Slide 10

FOBT



Slide 11

FOBT: Implementation

- Preparation (diet and medications)
- Periodicity (annual works best)
- Provider capacity (no special training needed)
- Slides should **NOT** be re-hydrated
- Follow-up
  - Positive FOBT: requires total colon exam
  - After a negative total colon exam, suspend annual FOBT for 5 to 10 years
  - Negative FOBT requires repeat FOBT in 1 year

Slide 12

FOBT: Evidence

	Minn, 1993	Minn, 1999	UK, 1996	Denmark, 1996
Frequency of Testing	Annual	Biennial	Biennial	Biennial
Duration (years)	18	18	8	13
Slide rehydration	Yes	Yes	No	No
% requiring colonoscopy	30%	30%	5%	5%
Mortality reduction	33%	21%	15%	18%
Incidence reduction	20%	17%		

Slide 13

Flexible Sigmoidoscopy

Fiberoptic sigmoidoscope

Slide 14

Diagram of the Colon and Rectum

Slide 15

Flexible Sigmoidoscopy: Implementation

- Preparation
  - (2 enemas day of exam, or complete bowel prep)
- Periodicity (5yrs)
- Provider capacity (training and proficiency)
- Follow-up
  - 5% to 15% will have a positive result
  - Positive result requires total colon exam
  - To biopsy or not?
    - Which provider?
    - Which lesions?

Slide 16

Flexible Sigmoidoscopy: Evidence

- Case-control study (Selby, 1992)
  - 59% mortality reduction in cancers within reach of sigmoidoscope
  - No mortality reduction in proximal cancers
  - Primarily rigid sigmoidoscopes
- Case-control study (Newcomb, 1992)
  - 79% mortality reduction in cancers within reach of sigmoidoscope
  - Primarily flexible sigmoidoscopes

Slide 17

Flexible Sigmoidoscopy: Counseling Your Patients

- Patient education material
- Expect moderate discomfort (like gas pain)
- Most patients report that it's not as bad as they thought it would be
- Sedation not routinely used
- Exam lasts approximately 20 minutes
- Patients able to return to work and don't need a ride

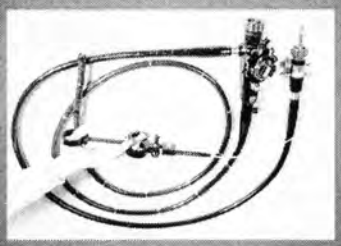
Slide 18

Flexible Sigmoidscopy + FOBT

- No randomized trial examining reduction in death using combination of tests
- Non-randomized trial [illegible]
  - Sigmoidoscopy + FOBT had lower mortality rate vs. sigmoidoscopy alone

Slide 19

Colonoscopy



Slide 20

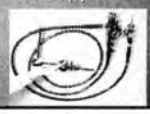
Colonoscopy

- Most accurate single test (the "gold standard") for detection of cancer and/or polyps
- No prospective trials for effectiveness of screening colonoscopy for reducing death
- Indirect evidence of efficacy from FOBT trials
- National Polyp Study supports effectiveness of polyp removal in cancer prevention

Slide 21

Colonoscopy: Implementation

- Preparation
  - powerful laxatives and/or enemas
- Provider capacity (specialized training)
- Follow-up
  - Positive result frequently treated during screening exam
  - Negative result requires repeat colonoscopy in 10 years



Slide 22

Colonoscopy: Counseling Your Patients

- Patient education material
- Expect moderate discomfort with preparation, but actual procedure performed under sedation
- Some patients experience discomfort during recovery
- Exam lasts approximately 30 to 45 minutes
- Patient requires ride home after procedure and usually misses a work day

Slide 23

Choosing an Appropriate Screening Strategy

Slide 24

When Not To Screen

- Screening guidelines do not apply to symptomatic patients
- Screening patients with terminal illness is unwarranted
- Benefits of polyp detection decrease with advanced age since it takes 5-15 years for an adenomatous polyp to progress to cancer

Slide 25

Factors to Consider in Choosing an Initial CRC Screening Strategy

- Patient's colorectal cancer risk
- Implementation issues/access/insurance
- Patient's preferences

Slide 26

Increased CRC Risk

American College of Gastroenterology (2008)

First degree relative with CRC or advanced adenoma ≥1cm in size, or with high-grade dysplasia or villous elements diagnosed at ≥ 60 years	Same as average risk population
Single first degree relative with CRC or advanced adenoma < 60 y.o. or ≥2 first degree relatives with CRC or advanced adenomas	Colonoscopy every 5 years beginning age 40 or 10 years younger than age at diagnosis of the youngest affected relative

Slide 27

Increased CRC Risk

American College of Gastroenterology (2008)

Gene carrier or Family History of FAP	Annual sigmoidoscopy or colonoscopy, as appropriate, until colectomy is best treatment
Gene carrier of Family History of HNPCC	Colonoscopy every 2 years beginning at age 20-25 until age 40 years, then annually thereafter

Slide 28

Average Risk: Everyone Else 50 to 75 Years of Age

Slide 29

Medicare Coverage

- All people with Medicare age 50 and older, no minimum age for having a screening colonoscopy

No Cost to beneficiary:

- Fecal occult blood test once a year
- Flexible sigmoidoscopy once every 4 years for high and low risk adults
- Colonoscopy every 10 years for average risk adults and every2 years for high risk adults
- Affordable Care Act waives copayment and deductible for these tests effective January 1, 2011

Slide 30

CRC Screening Is Now a HEDIS Measure

- Approved 2004
- First public report data available 2006
- Evaluates up to date screening for age 50-80
- Since health plans now have greater incentive to provide CRC screening they may encourage providers to screen

Slide 31

Estimated Costs of Colorectal Cancer Screening Options

• FOBT	$10 – $38
• Flexible sig	$150 – $700
• Colonoscopy	$800 – $1700

Slide 32

Questions About the Call to Action

Slide 33

How to Increase CRCS?

- Provider recommendation #1
- Provider-directed office systems interventions key to success
- PPRNet TRIP QI Model
  - Prioritize performance
  - Staff involvement
  - System redesign
  - Patient activation

Slide 34

PPRNet TRIP QI Model

Slide 35

Pre-Intervention Audit and Feedback

- 3-month retrospective medical record review for same time period from the previous year
- October 2010 through January 2011
- Research Assistant to help collect retrospective data with PI auditing every 10th medical record to ensure accuracy

Slide 36

Patient Data Criteria

- Sample Size of 400 over 3 months
- Inclusion Criteria for Patient Data
  - Active adult patients with a progress note, lab or consultation record within last year, between the ages of 50 and 75, and without any history of CRCS
- Exclusion Criteria
  - Active adult patients wit a history of CRC or with a terminal diagnosis

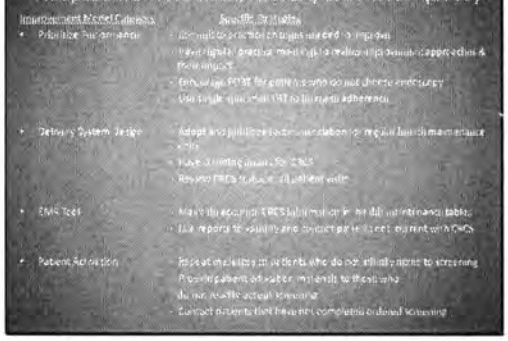
Slide 37

Interventions

- Site Visit
  - Set new practice vision and goals
- Academic Detailing
  - CDC Screen for Life slide adaptation presentation
- Participatory Planning
  - Team building and empowerment
- Best Practice Dissemination
  - Discussion of Improvement Strategies (Table 1)

Slide 38

CRCS Improvement Strategies Adapted from Nemeth, Nietert, & Ornstein (2009)



Slide 39

Prospective EMR Audit & Feedback

- EMR data collection from October 2011 to January 2012
- 1 month follow-up to allow sufficient time for patients to adhere to CRCS recommendation

Slide 40

Focus Group Interview

- Voluntary – Consent Forms
- De-identified demographic data of office staff to be collected
- Provide the quarterly EMR audit & feedback and continuation of academic detailing, participatory planning and best practice dissemination
- Focus group interview questions

Slide 41

Outcomes

- Primary Outcome
  - Assess the feasibility of adapting the PPRNet TRIP QI Model in a rural, independent primary care practice
- Secondary Outcome
  - Assess the effects of the PPRNet TRIP QI Model on CRCS recommendation and rates

Slide 42

Questions???

- You may call or email me at any time with questions
  - 304-415-0071
  - atassi@musc.edu

Slide 43

THANK YOU!!!